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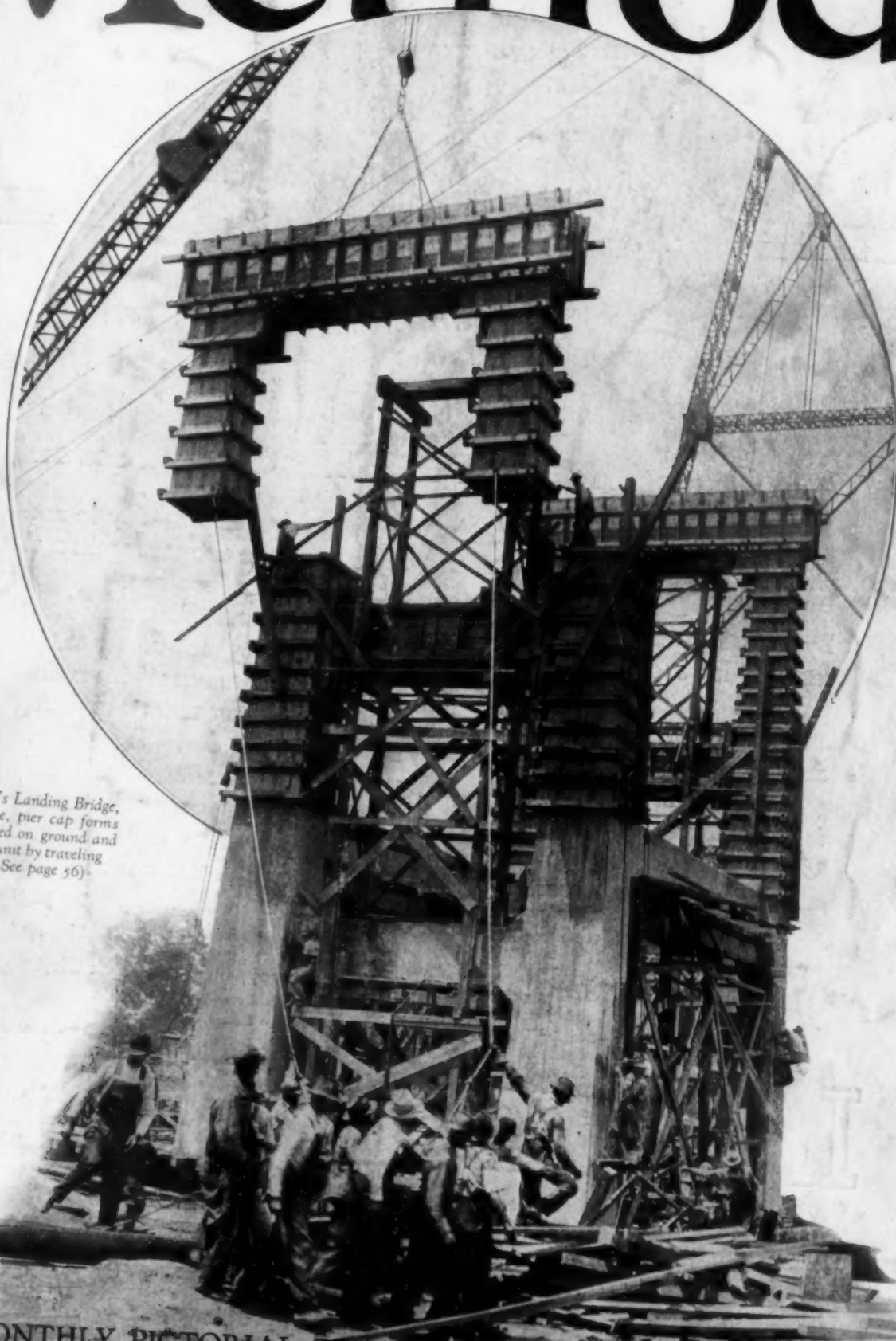
August
1929

Construction Methods

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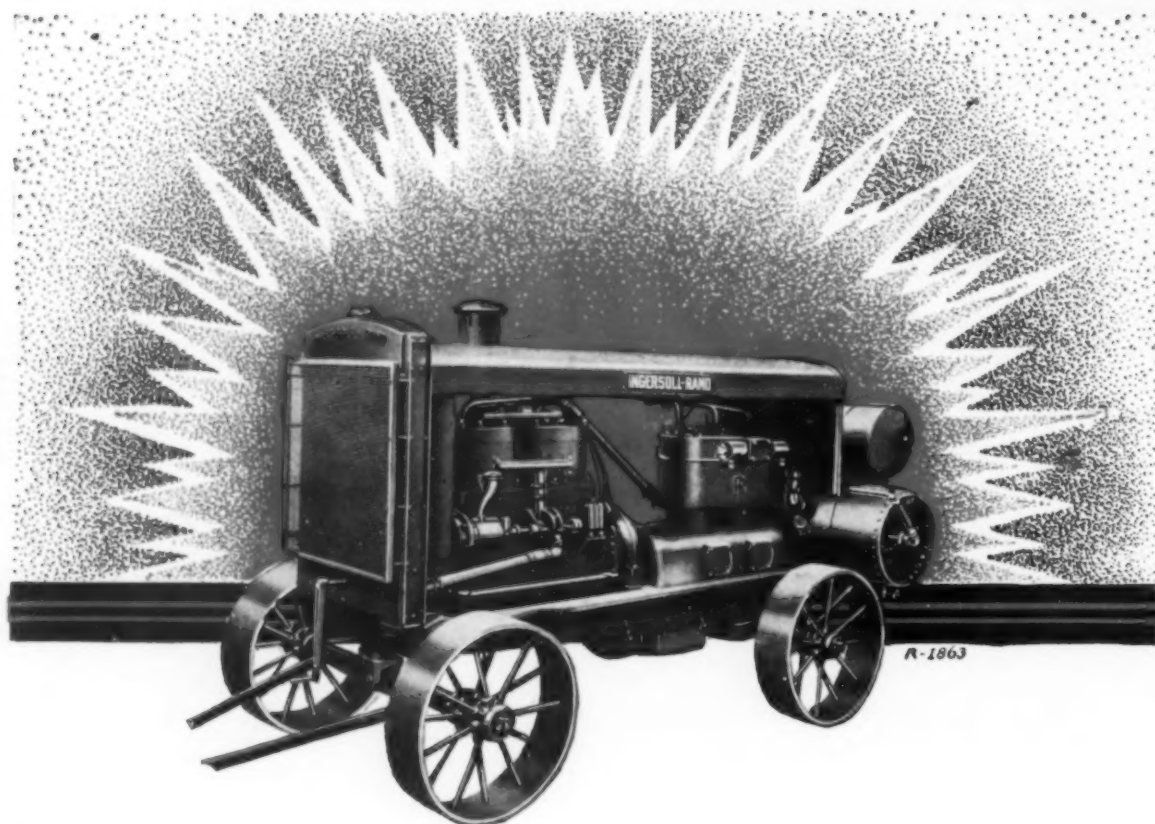
AUG 12 1929

CHICAGO, ILL.



For Trotter's Landing Bridge,
in Tennessee, pier cap forms
are assembled on ground and
placed as unit by traveling
derrick (See page 56).

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An Outstanding Portable Compressor

The I-R Portable has won its place by merit, and merit alone.

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The real test of any compressor is its ability to "stand up." Continuous service is, after all, the foundation of portable compressor economy. The unit

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August, 1929—CONSTRUCTION METHODS

TECHNOLOGY DEPT.

The Editor Notes --



Recognition for Service

RECOGNITION for employees with records of long, faithful and efficient service has taken a new and interesting form in the organization of A. Guthrie & Company, Inc., of St. Paul, Minn. As recently announced by President H. L. Mundy, a policy has been inaugurated of paying tribute to certain men who have "fought the good fight" by naming in their honor the larger pieces of the company's construction equipment. Name-plates, suitably inscribed, have been installed on heavy-duty power shovels and standard-gage locomotives in honor of Paddy Shields, Joe Laundry, Tom Morancy, and Charles Reiswick.

The plan, of course, is workable only in the case of an old established organization (32 years in the case of the Guthrie company) and one with heavy equipment having a comparatively long life. The idea has been followed in large industrial and railroad organizations, but this is believed to be the first instance of its use by a contractor.



The Super's Real Job

Watching a skyscraper in course of construction the spectator in the street sees a laborer loafing over his task, a plumber's helper smoking a cigarette and a bricklayer standing idle while a mortar tub is being filled. Yet these things are not the principal concern of the builder. True, he must be alert to correct abuses and has devised a reasonably efficient system for reducing them to a minimum, but after all this petty loafing, if it is not carried to excess, is but the "small change" of an operation, according to Col. W. A. Starrett, well-known New York building contractor, in his recently published book, "Skyscrapers."

On the larger aspect of the problem of getting work done Col. Starrett has this to say: "The building superintendent is thinking about ways to cut

CONSTRUCTION METHODS

A monthly review of modern construction practice and equipment

ROBERT K. TOMLIN, *Editor*

Editorial Staff

VINCENT B. SMITH NELLE FITZGERALD

J. I. BALLARD (San Francisco)

WILLARD CHEVALIER, *Publishing Director*

A McGraw-Hill Publication
Tenth Avenue at 36th Street, New York

the total number of bricklayer's helpers from 3 per mechanic to 1½ per mechanic—an arrangement of bins and runways, the location of the hoist with respect to the material storage space, the ways of stocking the floors in advance with brick and tile, the time chosen to do this stocking that he may accomplish his purpose. These are the big decisions and the ones on which the progress and economy of the work at the site depend. Little wonder that the superintendent does not get over-excited about a loafer; his case is easy. . . . Fire him."



Hints for Steel Workers

From the technical data bulletin service recently inaugurated by the American Institute of Steel Construction the following practical suggestions are culled:

(1) Rivets should be subjected to a soaking heat and their temperature before driving should not exceed 1,950° F., which is a light yellow color.

(2) A pneumatic rivet gun should not be used on rivets after the temperature is below 1,000° F., which is a blood red color. Below this temperature is the brittle range, and vibrating impact will loosen the rivet instead of tightening it.

(3) Do not use a flame cutting torch on steel which is carrying stresses.

(4) Calking should not be done until the temperature is below 200° F.

Low-Cost Roads

THE building of high-type paved roads, costing \$35,000 and upwards per mile, involves many more spectacular construction features in method and plant than the more modest, but none the less important, secondary routes of earth, gravel, or sand-clay. In the aggregate, however, the low-cost road represents a huge item in our total highway budget and is entitled to respect as an essential element of every state highway system. Far from being a fool-proof operation, its construction demands extreme care and painstaking attention to detail. In the construction of low cost roads North Carolina has been notably successful. One example of practice in that state is offered by the article on p. 58 of this issue, describing methods and equipment employed for graveling—at a cost of from \$900 to \$1,100 a mi'e. In these days when large-scale, expensive construction has become almost common-place it is worth while to revert to the simpler kind of job whose cost is measured in thousands, instead of millions, of dollars.



What Price Contracts?

For several years past highway contractors, individually and in convention assembled, have been vociferous in denouncing underbidding as one of the crying evils of the industry. In view of all the talk and the resolutions officially passed, it is interesting to cite the following statistics on contracts awarded by the New York State Division of Highways: Eighty-four contracts, covering 351 miles of highway, were awarded at an aggregate bid price of \$16,961,092, as compared with the state engineer's estimate of \$23,254,659—an average cut by the contractors, under the engineer's estimate, of about 27 per cent. For the 84 contracts awarded there were 522 bidders submitting 788 proposals.

Where will the profits come from?

The Currency of Progress

IDEAS are the currency of progress.

Locked up in one man's mind, they are as futile as a miser's hoarded gold. Not until they are brought out into the light and put to work are they productive, even for their owner. And only through translating them into accomplishment can he draw interest in the form of the new ideas that always flow from the day's work. For ideas in action breed new ideas.

Then too, new ideas put into circulation quicken the spirit of an industry and enrich the lives of all those who man it. From the play of mind upon mind, the exchange of experience and the interchange of viewpoint grows a harvest of new ideas that is bountiful and widespread in its benefits.

Sound ideas, wisely applied and widely circulated thus reap a double reward for those who conceive them and in addition forward the progress of the whole industry to the advantage of everyone.

All this American industry learned long ago. That is the reason for *Construction Methods* and kindred journals; to provide an exchange for the experiences, the observations and the ideas of a thriving industry, where each may offer of his own stock and draw interest from the wealth contributed by his fellows.

In short, to facilitate that circulation of ideas which alone can make for general progress.

Willard Chevalier
Publishing Director

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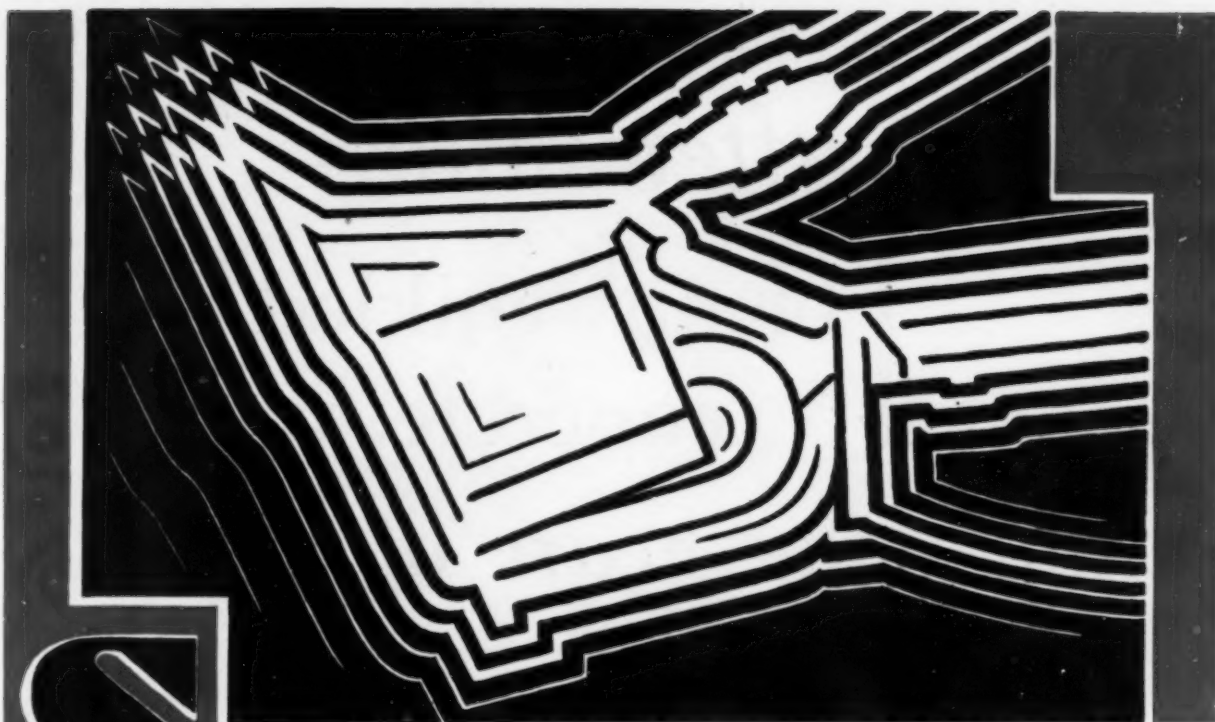
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hake Byers ½ yd. Bulldog ¾ yd. or 1¼ yd. Master Shovel dippers clean with fast vibrating crowd-retract motion made possible by the independent crowd. Byers Reversible crowd drum retracts dipper stick with high speed power. Shock absorbers save cable wear and lengthen serviceable life of crowd and retract cables.



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Byers ½ yd. full circle Bulldog Shovel, Crane, Dragline, Trencher, Skimmer

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SALES AND SERVICE THROUGHOUT THE COUNTRY

BYERS

SHOVELS AND CRANES

Mile after mile— [of unwrinkled] concrete, through the heart of TENNESSEE



A section of the concrete Dayton Pike, through Southern Tennessee. Carey Elastite Expansion Joint, installed transversely at frequent intervals, keeps the road smooth and prolongs its life.

A revelation to motorists, the inviting expanse of white concrete that ribbons through Hamilton County, in Southern Tennessee. One of the finest, smoothest roads in the South, because "shock absorbers" are *bonded right into the concrete.*

Carey Elastite Expansion Joint! It compresses readily under pressure—protects concrete against seasonal strains and prolongs its life. The water-tight, frost-tight sandwich joint, extensively used and recommended by leading engineers and contractors in every State in the Union. Manufactured by a

company who has been in business over fifty years—pioneer makers of expansion joints. Write for particulars about modern installation methods.

Carey Elastite
 EXPANSION JOINT

THE PHILIP CAREY COMPANY, Lockland, CINCINNATI, OHIO



**! A Northwest
of still
greater
capacity!**

See the Model 6—a 1½ cu. yd. shovel, 19-ton crane, 1½ yd. dragline and 59-inch pull-shovel—there is no other 1½ yd. machine like it!

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ENGINEERING CO.**

*The world's largest exclusive builders of gasoline
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Steel Forms by **BLAW-KNOX**

insure that St. Louis Sewers will be built economically and that the schedule of construction will run like a clock.

Where Blaw-Knox enters—*form grief* stays away from the job.

Blaw-Knox points with pride to twenty-three years of experience and engineering accomplishment in making thousands of concrete jobs economically possible.

Your work, large or small, can probably benefit by Blaw-Knox STEEL FORM engineering advice—*free for the asking.*

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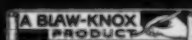
Chicago
Baltimore
Philadelphia

W. E. CALLAHAN CONSTRUCTION CO., are using Blaw-Knox Telescopic Steel Sewer Forms on the 32 ft. section of the River des Peres Drain for the City of St. Louis.

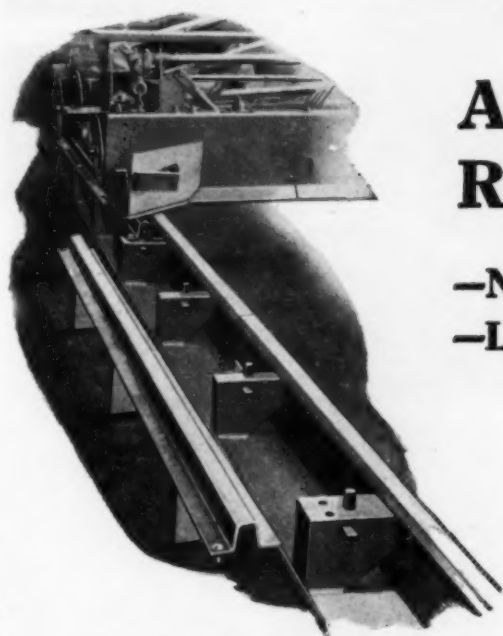
Ready Mixed Concrete, produced at a Blaw-Knox Central Mixing Plant, is hauled to the job and dumped from the trucks directly into the forms.



A. GUTHRIE & COMPANY, INC., are using inside and outside Blaw-Knox Telescopic Steel Sewer Forms on the 29 ft. section of the River des Peres Drain for the City of St. Louis, Mo.



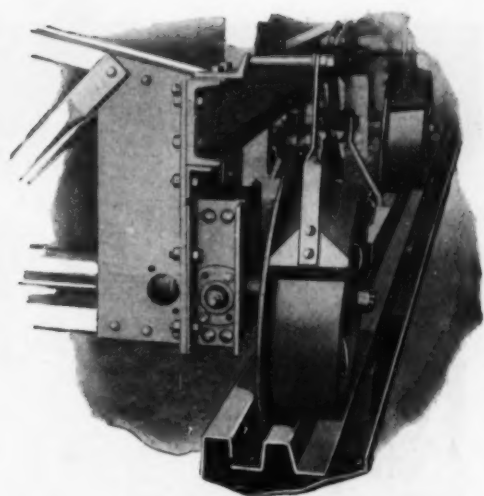
Announcing The "Duo-Rail" Form



Chairs fastened to Auxiliary Rail help distribute the load on the base of form. Rail joints are staggered.

A QUALITY Road Form

- No tipping
- Less Settlement



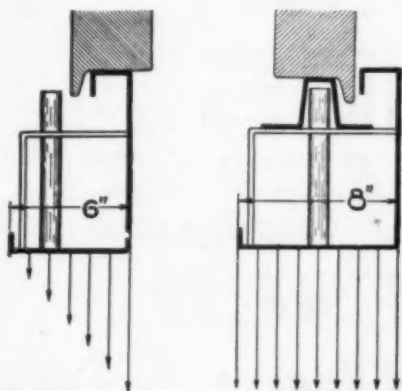
Puts the Load Where it Belongs

THE Lakewood "DUO-RAIL" Form Carries the load of the Finishing Machine over the **CENTER** of the base of the Form by means of an Auxiliary Rail which rests on the stake pockets.

A Super-Width 8" base with every inch giving 100% bearing value offers almost 300% more support.

The Auxiliary Rail is used only for the Finishing Machine, the floatbridge and other lighter equipment being carried as usual on the form proper, which also acts as a template for the screed member of the finisher. One hundred feet of Auxiliary Rail is all that is needed on each side of the finisher, being carried forward as the work progresses.

The Lakewood "DUO-RAIL" Form makes possible a smoother surface with less effort. Complete details of this first fundamental advance in road forms will be sent on request.

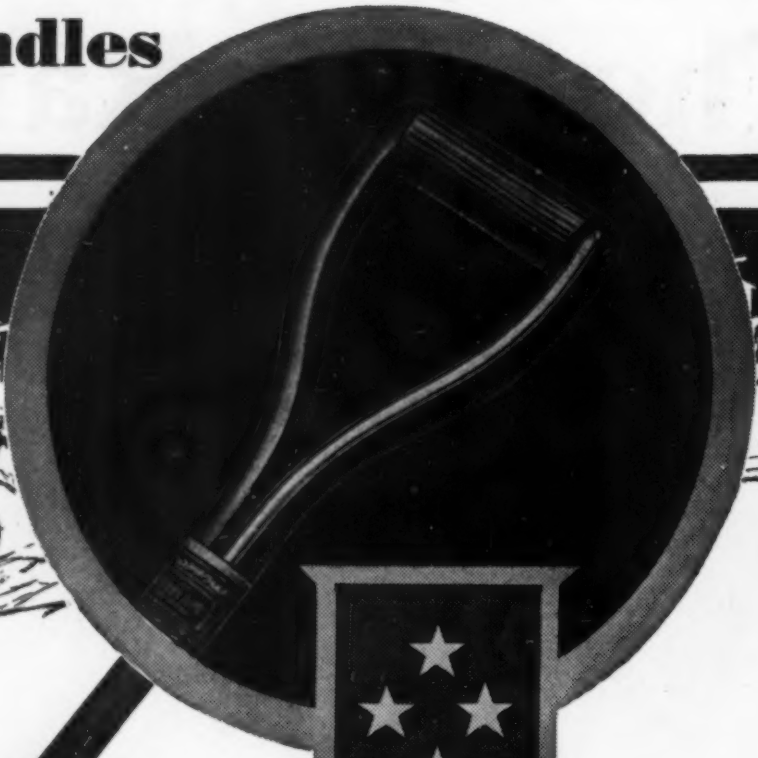


The Old Type of Form Bearing—present day form loading—inefficient and unstable, tips and settles under load.

The Proper Form Bearing—"DUO-RAIL" form loading on Super-Width 8" base, offering almost 300% added bearing value.

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**Only AMES SHOVELS have
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**MORE
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SHOVELS**

***are USED
than any other kind***

The complete "All Star" Ames line covers every shovel need. It will pay you to "look for the stars" on every shovel you buy.



1774

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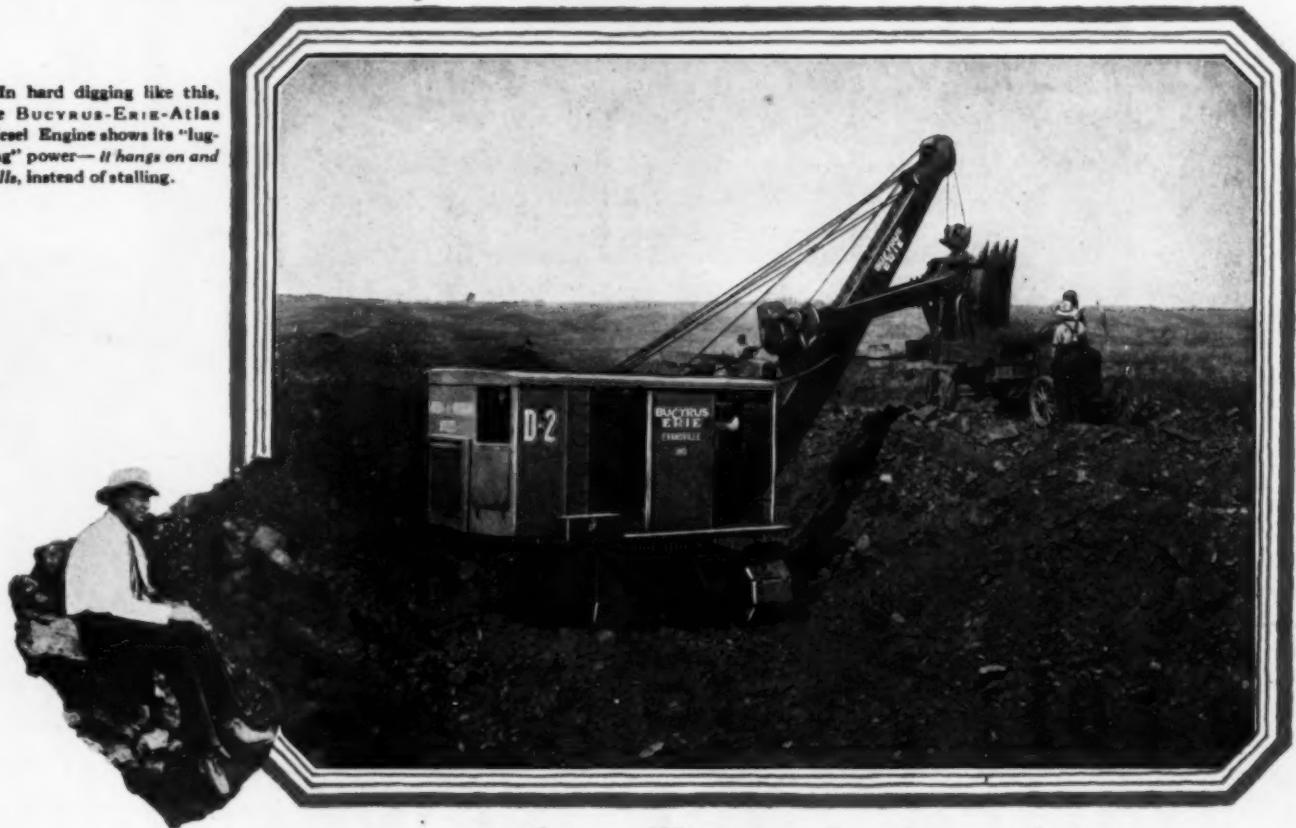


AMES SHOVEL AND TOOL COMPANY
NORTH EASTON «» MASSACHUSETTS
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Put yourself in his shoes—

In hard digging like this, the BUCYRUS-ERIE-Atlas Diesel Engine shows its "lug-ging" power—it hangs on and pulls, instead of stalling.



and you'll see why he writes:

"I've used them all, and can't see anything but a BUCYRUS-ERIE"

When you sit down alongside a job where you have a BUCYRUS-ERIE D-2 Diesel working, and size up what it's doing for you, you'll be as well pleased as other owners.

For instance, F. B. Richards of Richards & Moorman, Cushing, Okla. (who is quoted above) writes of their D-2 Diesel:

"Our BUCYRUS-ERIE D-2 Diesel gives a lot more yardage than other shovels—it's the snappiest shovel in the field, and has the staying quality and works with very low upkeep."

And this *seasoned Diesel* saves you 75% to 90% of fuel costs

This saving, made by the use of low-cost fuel and less of it, shows you an extra profit—over and above the bigger profits you make

from this reliable machine's steadier yardages.

The Reliability is due to an unequalled experience in building machines of this type—the "D-2" is a direct development from the original Diesel Excavator, built by BUCYRUS-ERIE. The BUCYRUS-ERIE "D-2" of today has the experience of hundreds of owners built into it.

From the power plant to the boom and dipper, it's built with rugged strength—giving an extra margin of Reliability for the hard digging.

Write us for a description of this *fully developed Diesel Shovel—Dragline—Clamshell—Crane—Drag Shovel.*

BUCYRUS-ERIE COMPANY

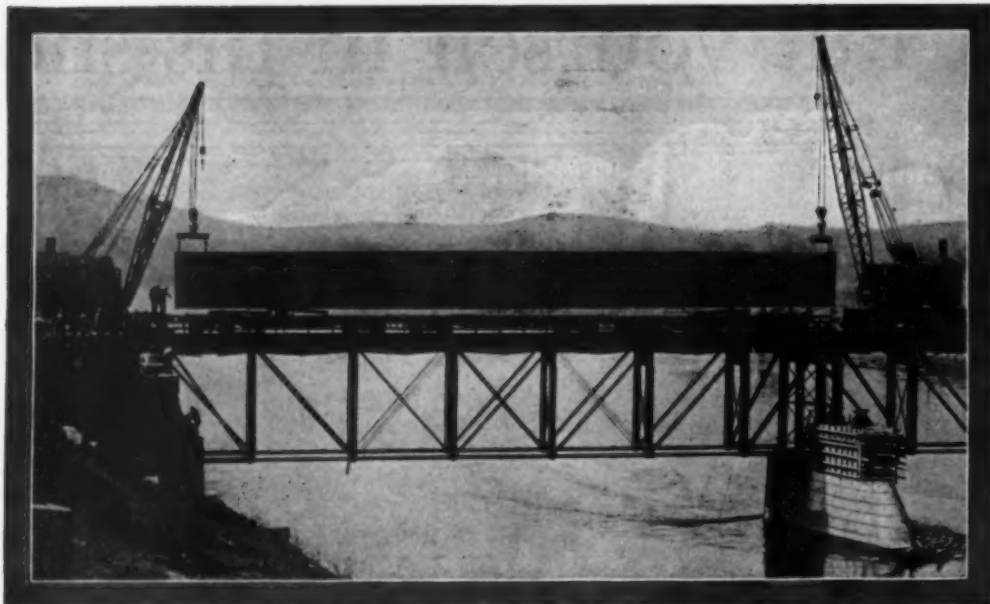
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Setting a 65-ton girder, 126 feet 7 inches long; on "INCOR" concrete piers 36 hours old, during the rebuilding of the Boston and Maine Railroad bridge over the Connecticut River, Westboro, N. H.

TWELVE DAYS Saved in Constructing New Bridge

THE rebuilding of the Boston & Maine Railroad bridge over the Connecticut River at Westboro, N. H., affords an interesting example of the use of "INCOR" Brand Perfected High-Early-Strength Portland Cement to speed important construction projects.

Less than 24 hours after placing the "INCOR" concrete, the seats for the bridge girders were set on the piers. Twelve hours later the heavy girders, each 126 feet 7 inches long, weighing 65 tons, were lowered onto the seats. "INCOR" concrete, only 36 hours old, successfully withstood this severe test of high-early-strength.

"INCOR" saved 12 to 14 days construction time. This saving was especially important because the railroad was only able to use one side of the bridge during the rebuilding operation and this necessarily interfered with train schedules.

"INCOR" Brand Perfected High-Early-Strength Portland Cement contains no admixtures; requires no special methods of handling. It produces permanent dependable Portland Cement Concrete that is service-strong in 24 hours. Wherever time is an important factor in an engineering job, it pays to specify "INCOR" Brand cement for the concrete work.



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342 Madison Avenue, New York

One of the world's largest cement producers—13 mills . . . total annual capacity 21,000,000 bbls.

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LONE STAR CEMENT COMPANY TEXAS
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URUGUAY PORTLAND CEMENT COMPANY
Montevideo, Uruguay

A Mouthful At Every Bite
... plus Power, Strength and
Endurance.

Owen Heavy Duty Type "D"
Buckets are the most powerful of
all clamshell digging buckets for
severe duty in hard materials. They
have no equals for efficiency and
wear resistance. They are right at
home in broken rock, shale, ore,
slag, coarse gravel, stiff clay...
making good the Owen Guarantee,
"A Bigger Day's Work." Write for
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Catalog showing the complete line.

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6023 Breakwater Avenue, Cleveland, Ohio

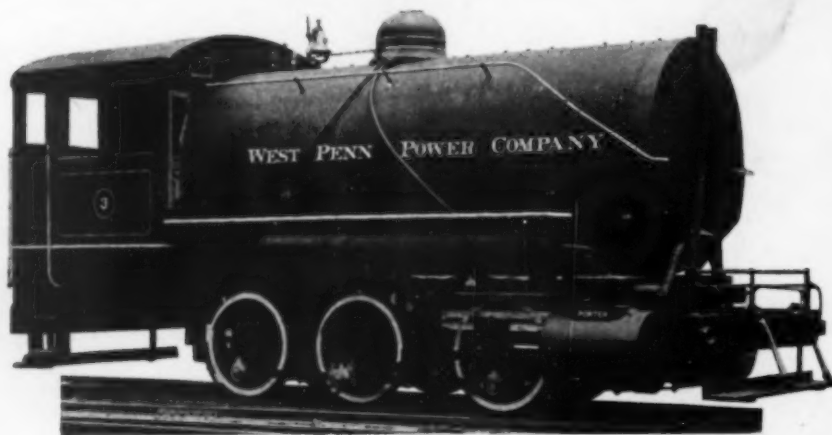


KWIESE



Owen Buckets

No standby losses



The advantages of the Porter Fireless Steam Locomotive are unique. With it you have no standby losses—no wasted fuel or idle labor. It is now possible for you to get the super-power of steam engine haulage with none of the expense of periodic repairs and inspection required of the regular steam engine.

For the Porter Fireless Locomotive has no boiler tubes to clog up, no firebox to feed, in fact none of the usual maintenance expenses.

Moreover the Porter Fireless is absolutely clean—no smoke, ashes or coal to contend with and the remarkable simplicity of operation makes it possible for unskilled labor to run it without difficulty.

Under certain plant operating conditions, the Porter Fireless is ideal. Let us acquaint you with its particular advantages. It may answer a haulage problem of yours of long standing.

H. K. PORTER COMPANY • PITTSBURGH, PA.

Established 1865

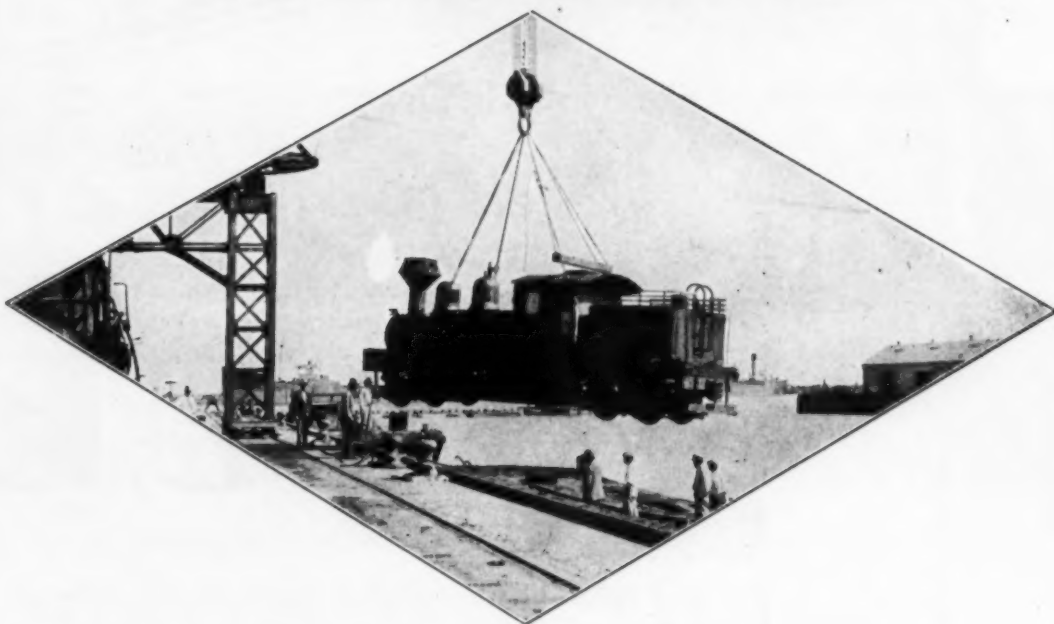
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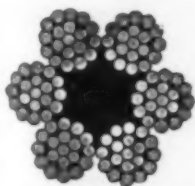


For Hard Work of All Kinds

Wherever wire rope is used for hard work; when or where conditions make strength and wearing qualities necessary; when safety is a vital factor—then and there is where "HERCULES" (Red-Strand) will give a good account of itself.

This wire rope is made of acid open-hearth steel wire and every wire used is first rigidly tested by us to make sure that it comes up to our exacting specifications. Furthermore, it is made in both Round Strand and Patent Flattened Strand construction in order to meet all working conditions.

If you will tell us how you use wire rope we shall be glad to suggest the construction we consider best for your work.



Made Only by

A. Leschen & Sons Rope Co.

Established 1887


5909 Kennerly Avenue
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New York

Chicago

Denver

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Quality + Price = VALUE

INSLEY QUALITY is definitely apparent throughout the Half-Yard Insley in its many modern features such as in its roller and ball bearings for the drum shafts—in its heavy and accurately machined castings—its machine cut gears—and the finest precision workmanship. All these and many other features definitely prove its quality.

Whereas Insley does not sell price, because low selling price might be taken as an indication of compromised quality, it so happens that there is a Half-Yard Insley, either half circle or full revolving, at a price that is truly out of the ordinary. This coupled with its high quality makes the Half-Yard Insley a value you cannot afford to overlook.

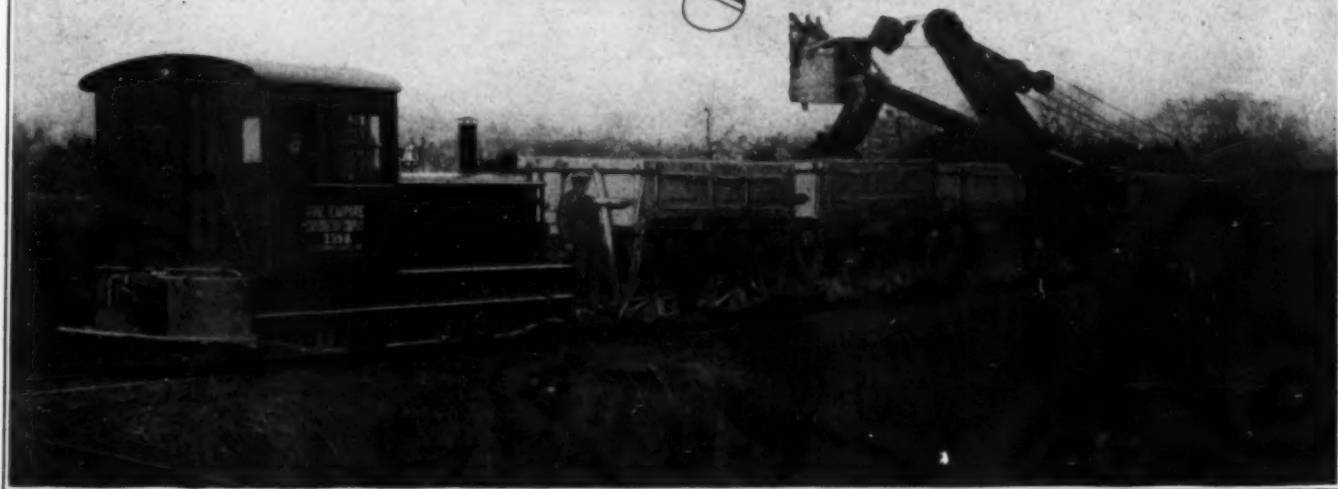
INSLEY · MANUFACTURING · COMPANY

INDIANAPOLIS, INDIANA

Division of National Equipment Corporation

INSLEY 

Six Plymouths And A Young Canal



Down in Cincinnati they are building a new railroad terminal. To make room they had to move Mill Creek out of the way—dug a new channel 2 miles long, 44 feet deep, 80 foot wide at the bottom—a regular canal job.

Eight hundred thousand cubic yards to be moved elsewhere.

Four 20 ton Plymouth Locomotives—two 24 ton—six Plymouths in all, hauled all the dirt. Some of this work according to the contractor, necessitated running Plymouth hauled trains over 10% and 12% grades.

In spite of high water that at one time covered the steam shovel, the job was completed on time—the locomotives never giving a minute's dissatisfaction.

*When you pay the
price of Plymouths
for Locomotives
you deserve
Plymouth Quality*

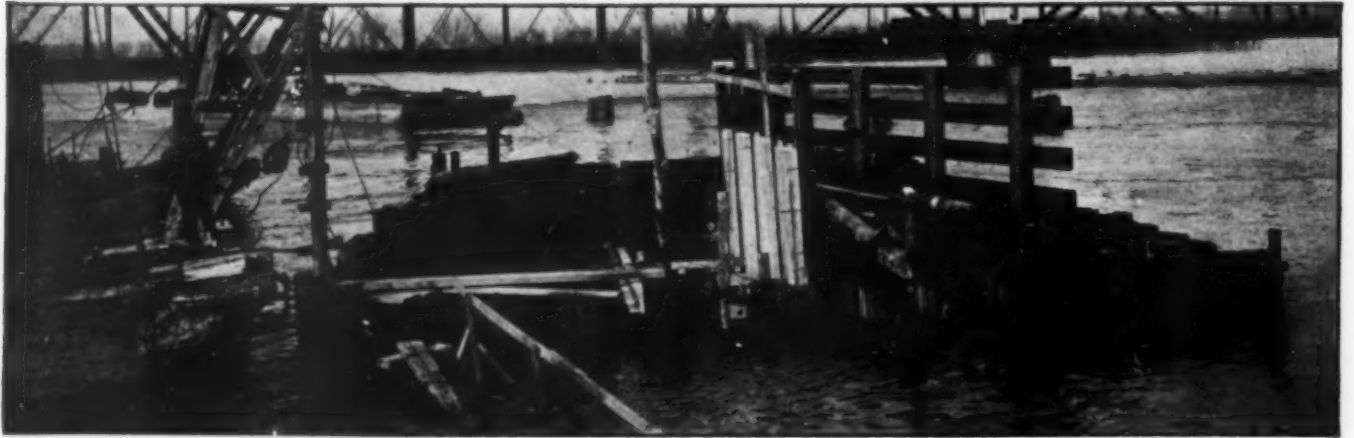
PLYMOUTH LOCOMOTIVE WORKS
THE FATE-ROOT-HEATH CO., 299 RIGGS AVE., PLYMOUTH, OHIO



PLYMOUTH

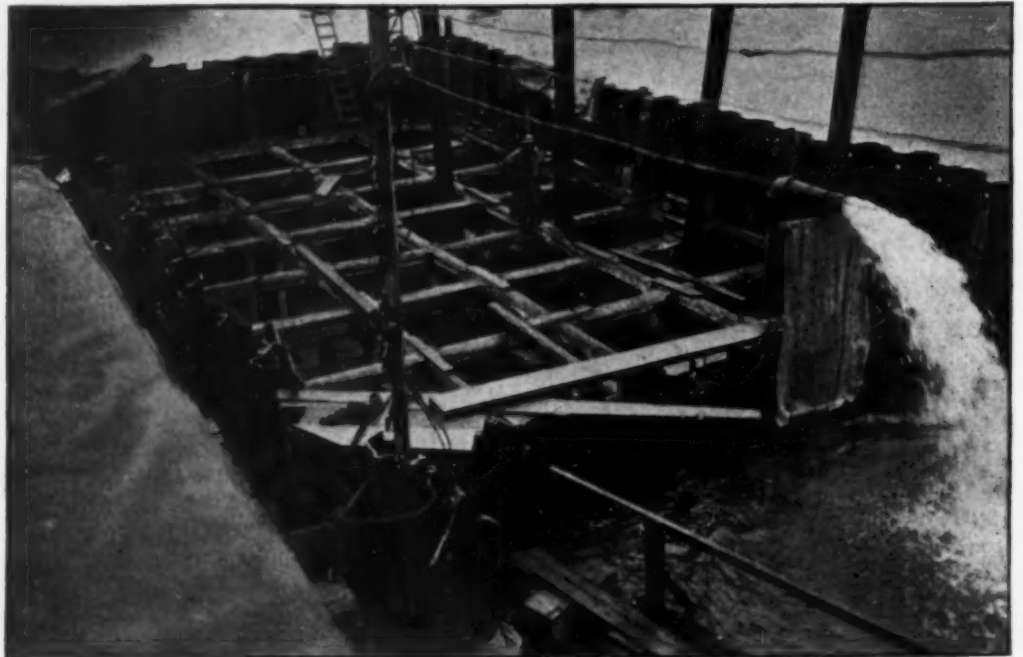
Gasoline and Diesel Locomotives

Lackawanna Deep Arch Piling



Section DP165 used for deep single-wall

Congress
Construction
Company,
Chicago, Illinois
—Contractors



Cofferdam at Pekin, Ill.

This 80 ft. x 40 ft. cofferdam was constructed in water 34 feet deep. The cofferdam was pumped out to a depth of 40 feet below water level. One 6-inch pump, in operation only half the time, kept the cofferdam dry.

Lackawanna Deep Arch Piling, section DP165, in lengths of 55 feet, was used on the job, this being the fourth time the contractors used this particular lot of piling.

The contractors commented upon the watertight-

ness and the high transverse strength of this Deep Arch Piling Section. During the concreting, the top cross braces were removed so that the piling actually supported a 13-foot head of water in cantilever with apparently little or no deflection.

BETHLEHEM STEEL COMPANY

General Offices: Bethlehem, Pa.

District Offices: New York, Boston, Philadelphia, Baltimore, Washington, Atlanta, Pittsburgh, Buffalo, Cleveland, Detroit, Cincinnati, Chicago, St. Louis, San Francisco, Los Angeles, Seattle, Portland, and Honolulu.

*Bethlehem Steel Export Corporation, 25 Broadway, New York City
Sole Exporter of our Commercial Products*

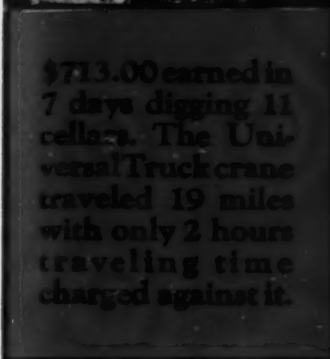
BETHLEHEM



\$1379.54 earned on 20 jobs in 25 days. Mobility in getting from place to place made this possible.



"We think nothing of sending the crane for ten miles to unload only one car of material." Universals easily average a car an hour.



\$713.00 earned in 7 days digging 11 cellars. The Universal Truck crane traveled 19 miles with only 2 hours traveling time charged against it.

There is Always a Job to Keep a Universal Truck Crane Busy Earning Money

Names of owners of the Universal Truck Cranes illustrated here, and details of the jobs handled, will be forwarded on request.

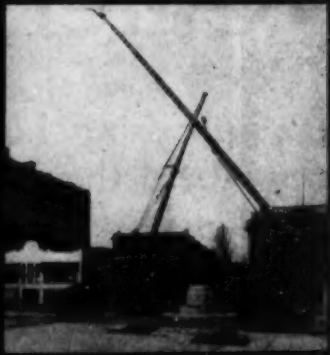
THE UNIVERSAL CRANE CO.
Lorain, Ohio



Universal Truck Crane, rented at \$60.00 a day, makes a profit of \$374.08 distributing and erecting 94 tons of steel. The job was completed in 32 hours.



Delivering 800 lb. bread mixer to second floor—a 2 hour job. Short jobs like these can be handled only with a mobile crane.



Averaged 700 feet of 24" to 72" concrete pipe per day. The same crane will do 1001 other profitable jobs for this contractor.



Universal Truck Crane placing flag pole weighing 4 tons, measuring 115 feet long. What other equipment could do this so easily?

UNIVERSAL



"Caterpillar" for Odd Jobs

It's surprising how useful "Caterpillar" Tractors can be to a growing city—here they're wrecking an old building in Roanoke, Virginia. They build new streets and help keep the old ones in shape. They clear the snow from sidewalk, avenue and skating pond. They build airports—leveling, draining, smoothing. The construction of a municipal golf course is a "Caterpillar" job. Often there is heavy hauling to be done. Wide tracks and *extra* power and amazing versatility make "Caterpillars" useful the year 'round!

Prices—f. o. b. Peoria, Illinois

TEN	\$1125	TWENTY	\$1975
FIFTEEN	\$1500	THIRTY	\$2475
SIXTY	\$4300		

Caterpillar Tractor Co.

EXECUTIVE OFFICES: SAN LEANDRO, CALIFORNIA
 Sales Offices: Peoria, Illinois, 50 Church St., New York, San Leandro, Calif.
 Holt Combined Harvesters / Russell Road Machinery
 "Caterpillar" Tractors

CATERPILLAR
 REG. U.S. PAT. OFF.
T R A C T O R

DRIVE

with

UNION HAMMERS!

The job: underpass for Sewer at North Bergen, N. J.

Hammer: Size 3 Union. 45 ft. leads. Crawler crane.

Another instance of a contractor preferring Union Hammers to all others!

Turn to page 8 of your new Union Catalog 124 and run over the features of these famous double-acting hammers: one piece frame, cylinder and ram guides cast into frame, no exposed working parts, bases to drive any kind of piling without damage to heads, special lubricating devices, etc. And then if you will dip a little deeper into the subject . . . you will begin to say to yourself: "I really should drive with Union Hammers."

Made in 10 sizes to drive and pull the heaviest piles or lightest sheeting.

UNION IRON WORKS

Engineers and Manufacturers

Newark and Grove Sts.

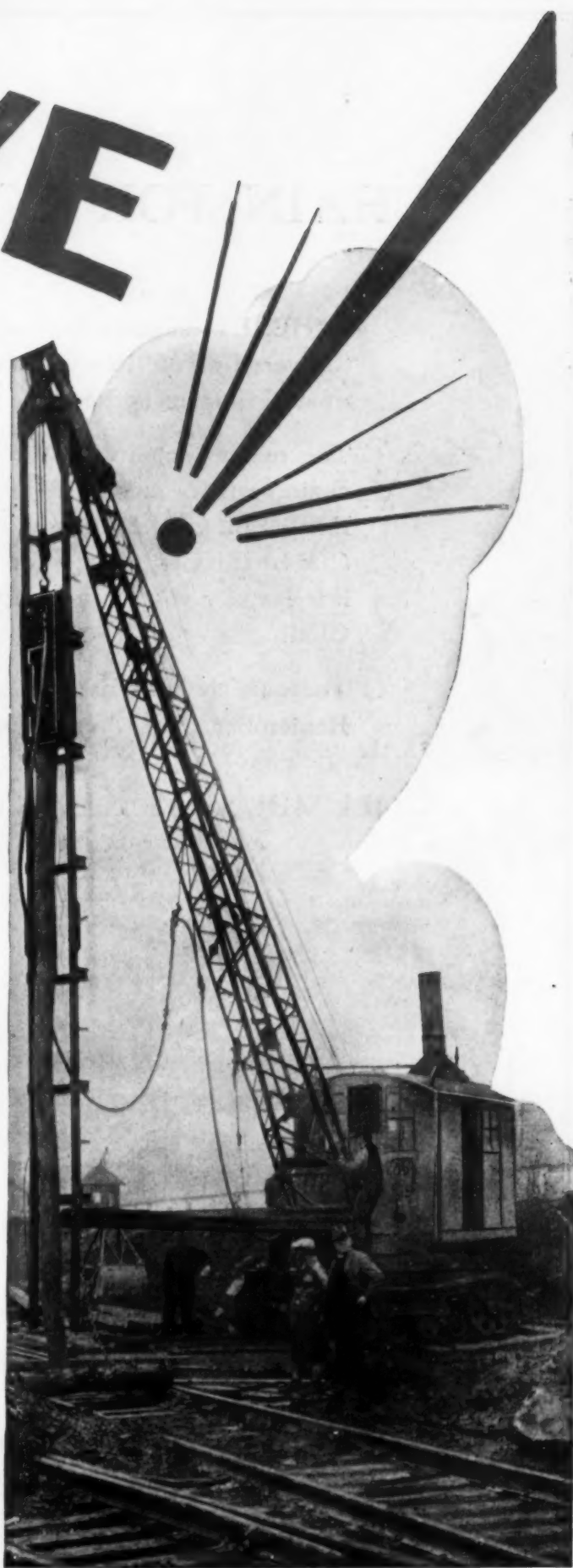
Hoboken, N. J.

Agents in Principal Cities

European Agents—Lidgerwood Limited, Friars House, London

UNION

DOUBLE-ACTING
PILE HAMMERS



CHAIN FOR CONSTRUCTION

THERE is an extra flash of reinforcing material on every link of "Inswell" chain - - - an extra muscle of steel that strengthens the weld.

This means a chain that lasts longer and that reduces chain costs for customers. Every link of this famous INSWELL CHAIN is now branded with the initials C-M by this Company. With this distinguishing mark it is easy for you to indentify the real "INSWELL" Chain.

There are chains—and chains, but only one INSWELL. Remember, C-M when buying your Chain.

COLUMBUS MCKINNON CHAIN COMPANY

ALSO MANUFACTURERS OF THE FAMOUS DREADNAUGHT TIRE CHAINS

PLANTS
Tonawanda, N. Y.
Columbus, Ohio

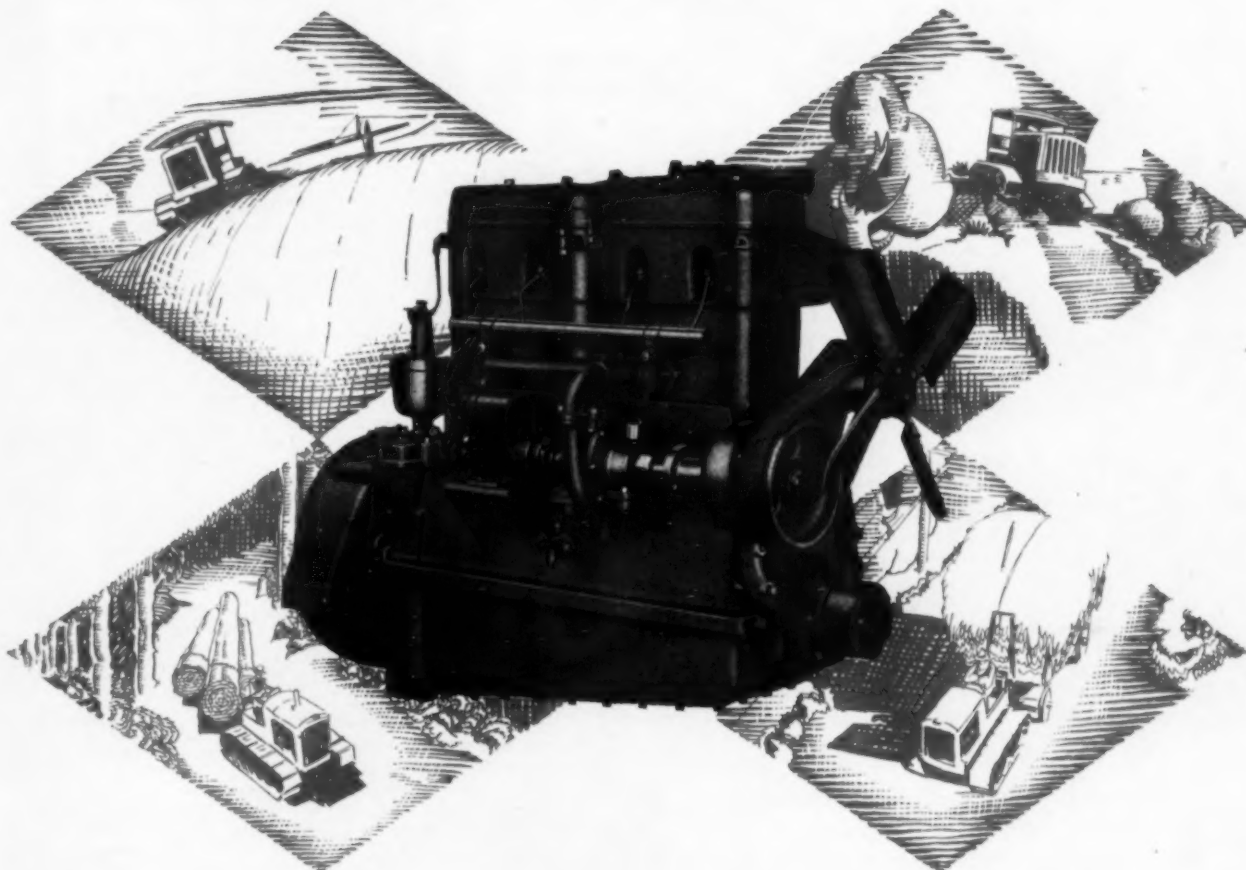
GENERAL SALES OFFICES
Tonawanda, N. Y.

IN CANADA
McKinnon Columbus Chain, Ltd.
St. Catharines, Ontario



LE ROI

For Dependable Power



Why Le Roi Has Wide Acceptance

1
Le Roi Engines cost less to operate and maintain.

2
Le Roi Engines have "oversized" parts for greater power.

3
Le Roi Engines have a fool-proof system of lubrication.

4
Le Roi Engines stay "active" longer.

5
Le Roi Engines are built by experienced and successful Engine Builders.

THE Le Roi Model "JA" is rugged . . . dependable . . . powerful. From every standpoint, the ideal heavy-duty engine. It is of the valve-in-head design, which gets the maximum power out of every explosion. "Oversized" working parts and vibrationless operation, and a fool-proof lubrication system assure dependable service over a long period of time. *Write for special bulletin.*

LE ROI COMPANY, Milwaukee, Wis.

LE ROI ENGINES

3 to 180 HORSE POWER



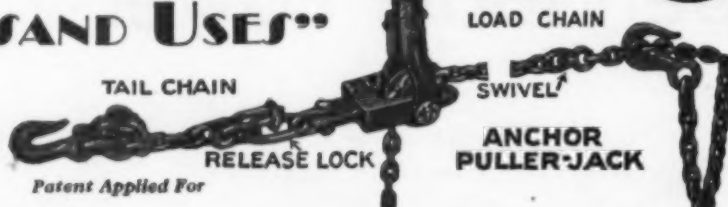
"Anchor" Puller-jack

"THE TOOL OF A THOUSAND USES"

TRADE MARK

COSTS \$36 COMPLETE ONLY

DOES AS MUCH AS 36 MEN



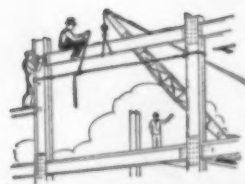
Patent Applied For

Sheave Block included in standard equipment; used to double the pulling power, or in making vertical lifts, pulling around corners, or in cramped quarters.



A One-Man Gang

A NEW, a quicker, cheaper way to handle the jobs of pulling, moving, lifting heavy loads. For most purposes the "Anchor" Puller-jack does the work of chain hoists, lifting jacks, winches, and block and tackle. Lighter than any.



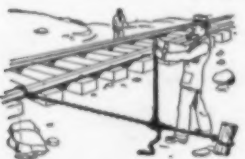
On structural steel work, your "Anchor" Puller-jack pulls and holds members in place for assembling. Also pulls together concrete forms, coffer-dams, etc.



Tightens guy wires on derricks and towers, stretches into place aerial cable ways. Used for wrecking, pulling down walls and structures, moving buildings.



When a loaded truck is ditched or mired, get it going with your "Anchor" Puller-jack. One man does the trick. Also used for warping and handling barges and scows.



On dumps, in quarries and pits, one man with an "Anchor" Puller-jack can move and shift your track anywhere.



Broken conveyor pulled together for splicing. Similarly used on ropes, belts, chains and bucket elevators.

Built Like a Battleship

Standard outfit consists of the machine itself with 3-ft. steel handle, 15-ft. load chain with slip-hook and swivel, 3½-ft. tail chain with grab hook, and sheave block.

The chains are special-made of high carbon steel, heat treated; provides a high factor of safety, will not stretch out of shape.

Sure as a Pinch Bar

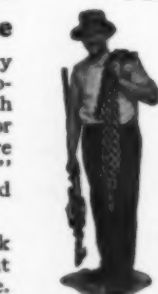
The "Anchor" Puller-jack is simple, fool-proof; practically nothing to get out of order. Positive action; always holds. Will not clog with dirt. Built to withstand roughest handling. One man with an "Anchor" Puller-jack does the work of a gang.

Simple as a Sledge

Can be operated in any position—lever upright, upside-down, or sideways; with lever pull toward the load or from it. No instructions are necessary—the "Anchor" Puller-jack cannot be used wrong.

The "Anchor" Puller-jack is only a small machine, but it shouts with a 5-ton voice.

You'll need it the day it gets on the job.



A one-man outfit; easily carried, easily operated, does the job.

A Strong Pull—

A Long Pull

Pulls the length of the load chain without taking a new hold. 15-ft. chain is standard equipment; special lengths as ordered. Quick release lock enables the load to be instantly released under full strain.

A 5-Ton Pull

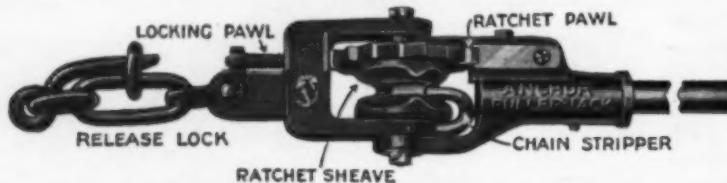
Certified tests by Pittsburgh Testing Laboratory, Pittsburgh, Pa.,
STRAIGHT LINE PULL
One man pulled 4800 lbs.
Two men pulled 6500 lbs.
WITH THE SHEAVE BLOCK
One man pulled 6700 lbs.
Two men pulled 9800 lbs.

Tests made with a stock "Anchor" Puller-jack equipped with standard 3-ft. lever; men stood on concrete floor. Out on the job men can dig in their feet and get a real pull.

Order Today—

You'll use it every day

"Anchor" Puller-jack, complete as described, \$36 f.o.b. our works, Reynoldsville, Pa. Shipping weight 82 lbs. Extra length load chain, quoted **\$36** on request. Crated for overseas shipment, \$1 extra.



Carried in stock by leading supply firms in all districts. If your dealer cannot furnish the "Anchor" Puller-jack, order direct from us. Immediate Shipment.

Manufactured by

T. H. EDELBLUTE COMPANY

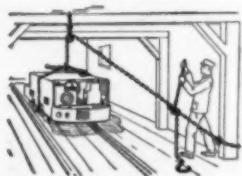
Oliver Building

Pittsburgh, Pa.

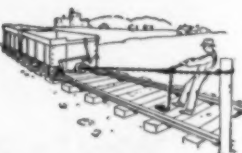
Also Manufacturers of "Anchor" Track Braces and "Anchor" Rerailers



Using the sheave block in setting a heavy crusher against a wall. The "Anchor" Puller-jack is a labor-saver on every construction job.



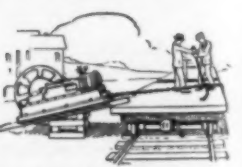
Lifts heavy machinery. Sheave block as used on a lifting job with "Anchor" Puller-jack.



Back on the track in a jiffy; don't wait for the locomotive. Lever works in any position. That's the "Anchor" Puller-jack.



Spots railroad cars anywhere you want them; handles them loaded, up steep grades, with ease. If partly loaded cars run past the loading point, one man gets 'em back quick.



Loads and unloads heavy machinery. An easy job, and under full control at all times with an "Anchor" Puller-jack.



force!

Monarch "50" power brings results

WHEREVER track-type tractors are used, Monarch Tractors are proving the correctness of their design and construction. By every test... on the most difficult jobs... this powerful and efficient tractor is setting new standards of performance. In road-building, industry, and agriculture, increased production and profits follow its use.

You can rely upon the world-famous Allis-Chalmers institution to offer you a product that is thoroughly reliable. The tremendous Allis-Chalmers resources... financial, engineering, manufacturing and selling... are unreservedly back of every Monarch Tractor. It is the ideal machine for power jobs of every type. Write for detailed specifications of models, and prices.

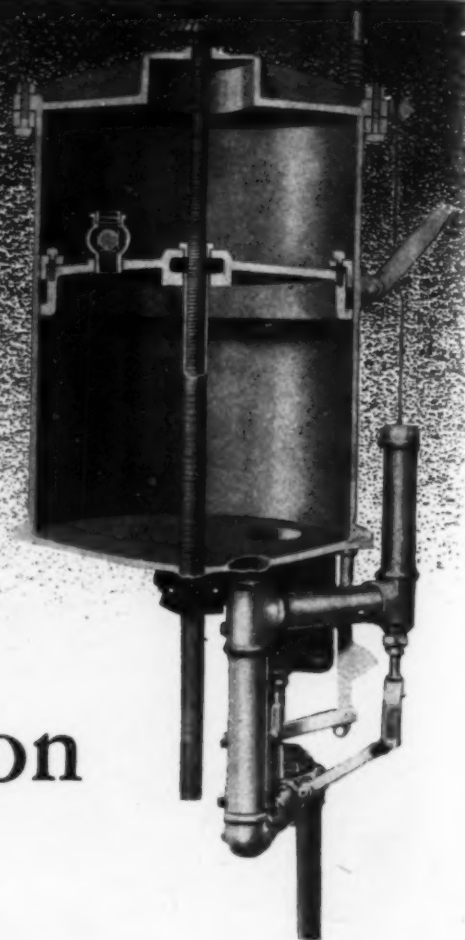
ALLIS-CHALMERS MANUFACTURING CO.

Specialists in Power Machinery Since 1846
MONARCH TRACTORS DIVISION SPRINGFIELD, ILL.

Allis-Chalmers
**Monarch
M Tractors**

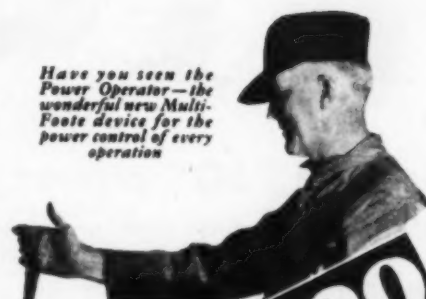


The
piston setting
assures absolute
water
Accuracy
 with every operation
 of the tank



In the new MultiFoote Water Tank the piston which gauges the amount of water for the mix is set to micrometer adjustment by a hand crank. *This piston never moves and the setting must remain the same with every operation of the tank assuring absolute water accuracy with every mix!*

Have you seen the Power Operator—the wonderful new Multi-Foote device for the power control of every operation



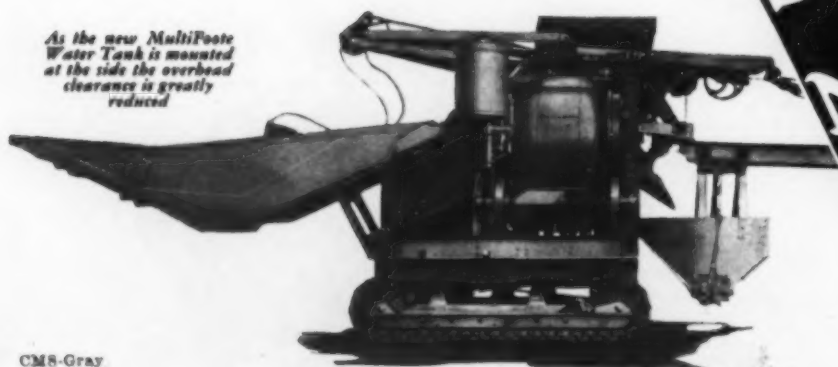
THE FOOTE COMPANY, Inc.
 of Nunda, New York

World's largest exclusive builders of road pavers

Sales and service representatives in all principal centers

See the 1929
MULTIFOOTE
The Paver with Timken Bearings

As the new MultiFoote Water Tank is mounted at the side the overhead clearance is greatly reduced



CMS-Gray



Do We Manufacture Hose? LOOK!!

Air Compressor
Air Drill
Gasoline
Oil Conducting

Oil Suction and Discharge
Oxy-Acetylene
Paint
Pneumatic Tool

Suction
Sand Blast
Steam
Water

also:

Diaphragms

Gaskets

Packing

Fill in the attached coupon and send it to the branch located nearest to you.

BRANCHES:

Baltimore
Dayton

Boston
Detroit
Pittsburgh

Buffalo
Milwaukee
St. Louis

Chicago
New York
Toledo

Cleveland
Philadelphia

We would like prices on.....feet.....lengths.....Hose

Name

Street Address.....City, State.....

CONTINENTAL RUBBER WORKS, Erie, Pa., U. S. A.

C. C. KERNER, Exclusive Foreign Representative: 152 Chambers St., New York City

Shake It!

DON'T worry about sticky, gluish digging — the Koehring is one gasoline shovel the dipper of which you can shake as vigorously as you ever shook a steam rig!

Crowds above and beyond the end of the boom! Don't forget that! That's why the Koehring, with long sticks and without a long, clumsy boom, has plenty of working room in close quarters that would be a problem to many shovels, yet has fullest working range!

Know about Koehring FingerTip ease of control, about Independent crowd and hoist —

Know the Koehring!



Shovel Capacities

Line of plate struck measure. Shock absorber on boom. Quickly convertible to pull shovel, crane or dragline.

No. 301— $\frac{1}{2}$ yd. dipper on 16' stick, standard. Other dippers on proportionate stick lengths. Wisconsin 4 cylinder gasoline engine, $5\frac{1}{4}$ "x6 $\frac{1}{2}$ ", 1060 R.P.M.

No. 501— $1\frac{1}{4}$ yd. dipper on 16' stick, standard. Other dippers on proportionate stick lengths. Wisconsin 4 cylinder gasoline engine, 6"x7", 1075 R. P. M.

No. 601— $1\frac{1}{2}$ yd. dipper on 16' stick, standard. Other dippers on proportionate stick lengths. Wisconsin 6 cylinder gasoline engine, 6"x7", 925 R. P. M.

*Division of National
Equipment Corporation*

KOEHRING

KOEHRING COMPANY MILWAUKEE, WISCONSIN
PAVERS, MIXERS — GASOLINE SHOVELS, PULL SHOVELS, CRANES AND DRAGLINES

*Sales Offices and Service Warehouses in all principal cities
Foreign Department, Room 579, 50 Church Street, New York City*



A5177-1

Calcium-ize *your* dirt *and* gravel roads



The dust nuisance on a typically untreated road.

**"3-C" Calcium Chloride
Conquers Dust—
and pays for itself in
road surface materials saved**

"3-C" Calcium Chloride effectively suppresses dust by maintaining a blanket of moist earth on the road surface. It absorbs as much as twice its own weight in moisture from the atmosphere.

ECONOMICAL

The action of "3-C" Calcium Chloride provides an efficient road binder—the surface becoming firm and compact under traffic.

The cost of treating roads with "3-C" Calcium Chloride is low, varying from 3c. to 5c. per square yard, per season. Quickly and easily applied with spreader attached to truck.



CONSTRUCTION METHODS—August, 1929

The paint people
are right—

*"Save the surface
and you save all."*

to THIS!



The road treated with "3-C" Calcium Chloride is dustless.

DUST IS AN ENEMY to cleanliness, comfort and health.

DUST IS ALSO WASTE! The dust that is allowed to blow from a road simply means the scattering of road surface material that at some time must be replaced.

"3-C" CALCIUM CHLORIDE provides the most economical and convenient means of suppressing the dust nuisance, and lowering maintenance costs by acting as an efficient binder for road surface material.

In the interest of convenience, better living conditions and economy in road maintenance send the coupon for complete information about "3-C" Calcium Chloride for dust prevention.

**The
Columbia Products Co.**
Barberton, Ohio

Selling agents for the Columbia
Chemical Div. Pittsburgh Plate
Glass Co.

.....
The Columbia Products Co., Barberton, Ohio
Please send complete data on the use of "3-C" Calcium Chloride for
Dust Prevention.
Name
Street
City
CM-8-29

FLASH-STOP! FLASH-STOP!

Even in the blinding rain this intermittent warning flasher catches the eye of the traveler—*and stops him!*

The new EVEREADY PORTABLE FLASHER *guards human lives*

AUTUMN's equinoctial storms . . . driving sheets of rain . . . sweeping black slippery pavements. Throughout the whole night the Eveready Portable Flasher shoots its warning flash! flash! flash! . . . Guarding life! Preventing accidents!

Four Eveready Dry Cells supply sure, certain light for months *and months!* The flasher is built of tough, heavy metal, the top cadmium plated. The Eveready Portable Flasher is made to last for years. Will go two to three months at a time without attention! *No wonder maintenance charges are low.*

Contractors and highway construction companies find the Eveready Portable Flasher invaluable. *It costs less to use and saves disastrous and costly accidents.* Is safe and fire-proof. Many municipal, county and state officials are cutting down expense and danger of accident by installing Eveready Portable Flashers for emergency use on all road trucks in their departments.

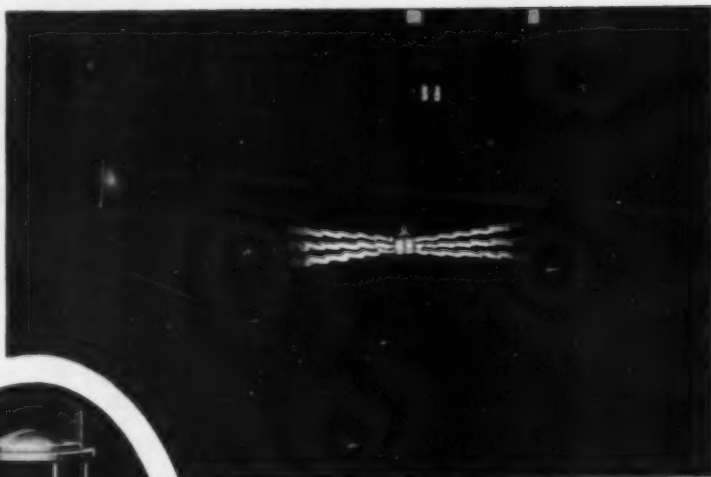
NATIONAL CARBON CO., INC.
New York, N. Y.

Branches: Chicago Kansas City
New York San Francisco
Unit of UCC and Carbon
Union Carbide Corporation

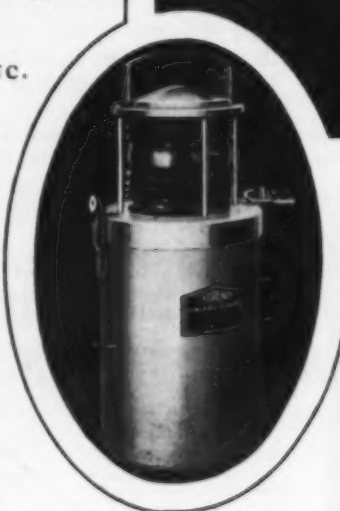
EVEREADY
TRADE MARK
PORTABLE FLASHER
— dry battery operated



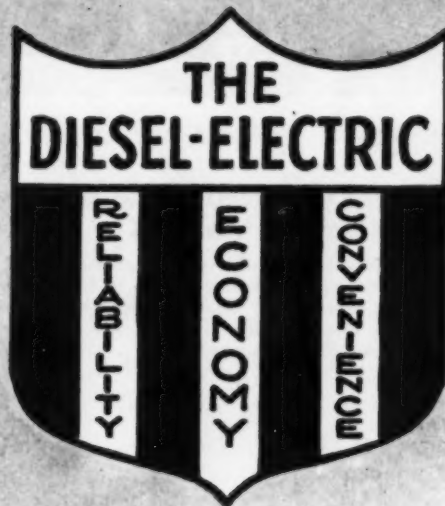
For construction work



As a traffic warning



SPECIFICATIONS — Height 16 inches. Diameter of base 7 inches. Weight, including batteries, 16½ pounds. Requires four standard Eveready 6-inch Dry Cells connected in series to deliver 6 volts. Extra 6-volt lamp inside battery housing. Battery compartment constructed of seamless steel attractively finished in red. Top of flasher cadmium plated for weather protection. Heavy fresnel-type glass lens in red or other colors. Padlock for battery compartment with an extra-long hasp so that the device can be chained. This flasher is of rugged construction throughout and entirely weather-proof.



AND NOW
A
MARION
DIESEL-ELECTRIC

TIDEWATER Timber Co. of Portland, Oregon, finds in this new shovel all the economy of the Diesel with the fine operating characteristics of the steamer. Ask for full details.

THE MARION STEAM SHOVEL CO.
MARION, OHIO, U. S. A.

MARION

Adaptable

Do you need dense, water-tight concrete in a hurry?

Sections of this power-plant dam, Kaukauna, Wis., made with *High-Early-Strength Universal Concrete*, were ready to hold back an artificial lake 3 days after placing. C. R. Meyer & Sons, Kaukauna, Wis., contractors.



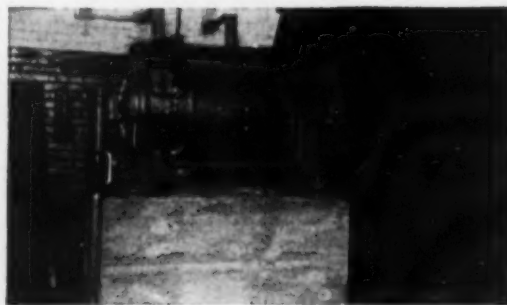
Do you need concrete that stands up under the heaviest of traffic in from 2 to 4 days?

This heavy-duty pavement of *High-Early-Strength Universal Concrete* in the coal and building material yard of the Consolidated Co., Chicago, was sufficiently strong and durable in 3 days to permit the operation of a heavy yard-crane upon it.



Do you need quickly usable concrete that is durable under the constant vibration of moving machinery?

This machine at the Braddock, Pa., plant of Carnegie Steel Co. was mounted and ready to operate 3 days after its new base of *High-Early-Strength Universal Concrete* was placed.



By applying the tested methods described in these booklets, you obtain with the same Universal cement used for regular work, high-early-strength concrete that is adaptable to all kinds of work requiring dense, durable, water-tight concrete. Just mail the coupon for your copies.



Name _____

Address _____

Universal Portland Cement Co.
208 So. La Salle Street, Chicago
Without obligation, please send me the following booklets:
☐ High-Early-Strength Concrete
☐ General Building Edition
☐ Paving Edition
C. M. 8-29

One Standard Cement for All Concretes and Mortars
Universal Portland Cement Co.

Subsidiary of United States Steel Corporation

Chicago Pittsburgh Minneapolis Duluth Cleveland Columbus New York
Concrete for Permanence

Construction Methods

A MCGRAW-HILL PUBLICATION—ESTABLISHED 1919

ROBERT K. TOMLIN, *Editor*

VOLUME 11

NEW YORK, AUGUST, 1929

NUMBER 8

Ride 'Em, Cowboy!



WILLIAM BROS., contractors of Hannibal, Mo., are building 400 miles of a 1,200-mile line of 12-in. pipe which will connect the oil fields of Cushing, Okla., with the refinery at Chicago. The right-of-way is laid out over extremely rough country which demands the use of equipment which will successfully work on hills, through ravines and in all kinds of ground conditions which will be found on cross-country route. Caterpillar tractors supply the traction and power for hauling materials, placing the welding machines, bending the pipe and dragging it into position for welding. From 2,000 to 2,500 ft. of pipe are laid per day.

In bending the pipe to conform to the grade and alignment of the trench the tractor is employed to hold one end down while the center is raised by a block and fall rig mounted on a portable steel A-frame as shown in the photograph at the left.

This Month's "News Reel"



FIRST CABLE for construction foot-walk of Hudson River bridge was strung between towers on New York and New Jersey sides July 9. Cable first was laid down on river bottom from barge and raised by cranes to tops of two towers.



RAZED BY DYNAMITE. Remains of standing section of St. Francis Dam, Calif., which failed last year, are demolished by blast of 24 tons of gelatin dynamite.

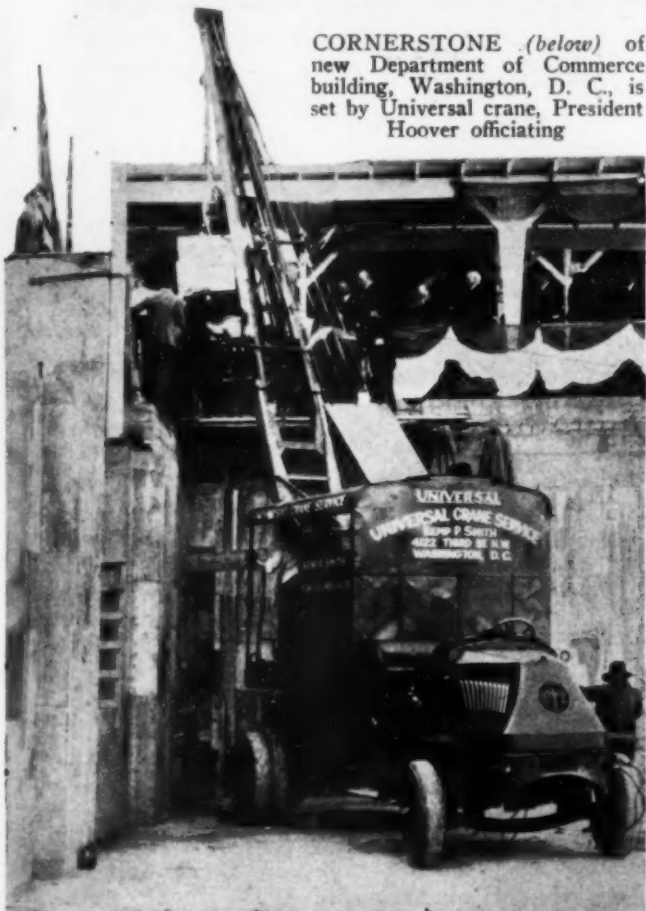


MONUMENTAL STRUCTURE costing \$13,000,000 recently completed to house 26-story home for "Chicago Daily News." Building is constructed over railroad tracks where hundreds of trains pass daily. Hegeman-Harris Co., Inc., was the contractor.

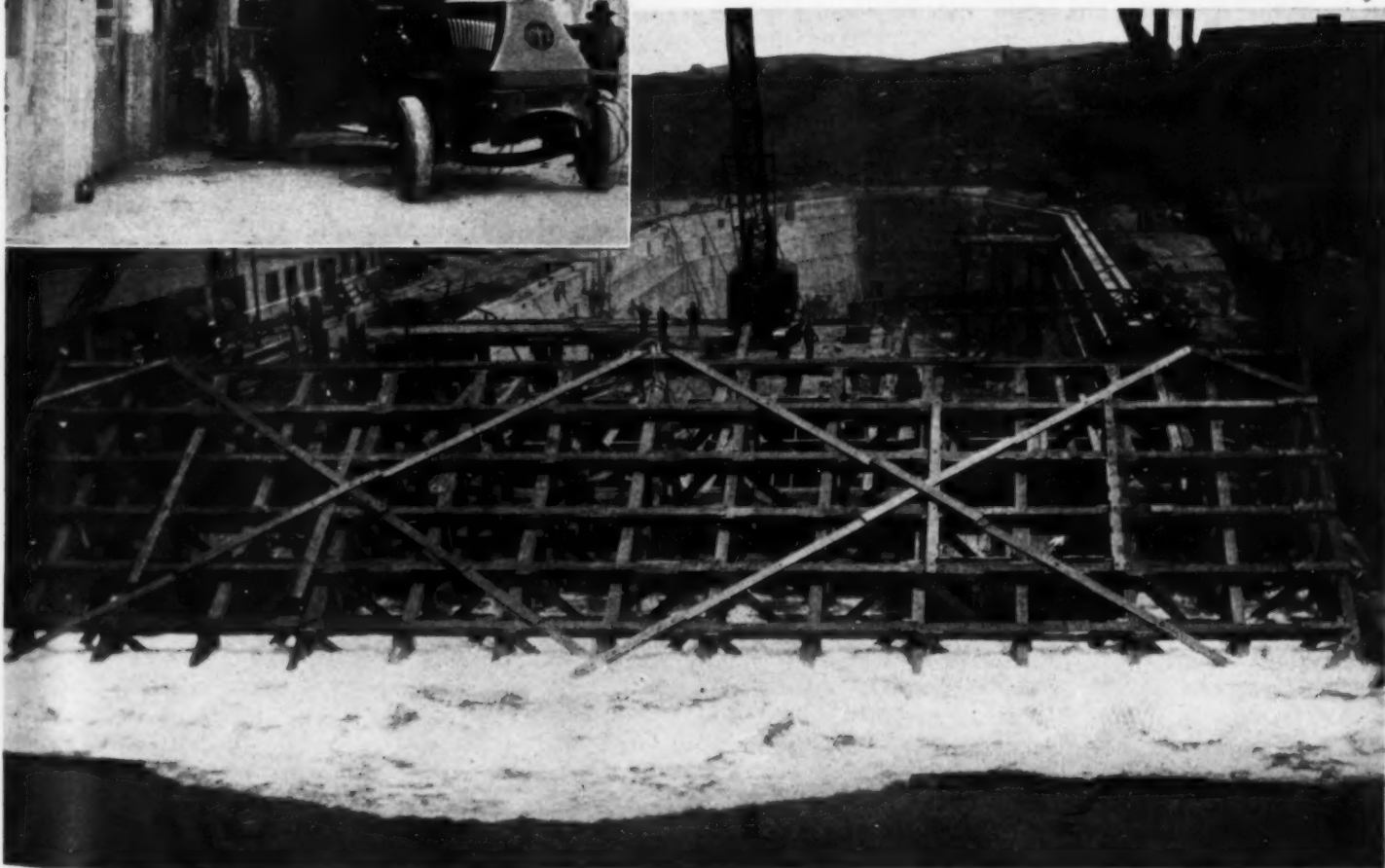


NEW BIG FOUR BRIDGE spanning Ohio River is now open to railroad traffic between Louisville, Ky., and Jeffersonville, Ind.

CORNERSTONE (below) of new Department of Commerce building, Washington, D. C., is set by Universal crane, President Hoover officiating



LARGEST STRUCTURAL FRAME erected by gas welding. Building is a 75x260-ft. mill type structure at plant of Union Carbide Co., Niagara Falls, N. Y.



DRY DOCK CRIB LAUNCHING. Timber structure, 120 ft. long and 47 ft. wide, strikes water after sliding down ways preparatory to service as bracing for steel sheet piling in out-shore cofferdam of new dry dock for Todd Shipyards Corporation, Robins Dry Dock & Repair Co. plant, Erie Basin, Brooklyn, N. Y.

Photo from
FREDERIC R. HARRIS
Consulting Engineer
New York City

Earth Fill of SALUDA

PUDDLING POOL (below) for core of Saluda Dam. Train is side dumping. Beyond is long stretch of next lift of dumping trestle. Floating line carries electric power to pumps serving hydraulic giants



A RECORD of placing more than a half million cubic yards of fill in a calendar month in the Saluda Dam being built by W. S. Barstow & Co., Inc., near Columbia, S. C., has called for an alert organization, well-matured plans and a thoroughly co-ordinated plant on the part of the Arundel Corporation, of Baltimore, Maryland, sub-contractor on this \$22,000,000 hydro-electric project. In September, 1927, the Lexington Water Power Co., a subsidiary of General Gas & Electric Corporation, which is a part of the Associated Gas & Electric Co. system, started actual work on the Saluda hydro-electric development. When completed, the dam, comprising 11,000,000 cu.yd. of fill, will be the largest earth dam in the world for hydro-electric development. For this year the constructors expect to average 450,000 cu.yd. of earth fill per month, with peak outputs exceeding 600,000 cu.yd. monthly.

Dimensions—The Saluda dam, at its crest, is 7,900 ft. long and 25 ft. wide. Downstream and upstream faces will have slopes, respectively, of 2 to 1 and

3 to 1. The maximum height is 208 ft. above the excellent rock foundation.

The 11,000,000 cu.yd. of material in the dam is not merely an earth fill, but contains a puddled core approximately 20 ft. wide at the top and with slopes of 1 to 2 on both sides. It has been necessary to maintain accurately certain balanced and other controlling conditions during the placing of the upstream and downstream dikes enclosing the puddled core. These requirements call for far greater care in making this immense fill than would obtain in any ordinary earth-moving job.

For handling a maximum stream flow of 57,000 sec.-ft. during construction the contractor built four 16-ft.

diameter steel tubes encased in concrete, which will later be used as penstocks in the power plant, and a fifth concrete arched-section by-pass with a cross-section equivalent to a circle 30 ft. in diameter. The methods and plant used in building these structures were illustrated and described in *Construction Methods* for November, 1928.

During the time this concrete work was under way the foundation of the dam was stripped with steam shovels and cranes. The spoil from these operations was piled below the site for use later in the portion of the embankment on the downstream side of the puddled core.

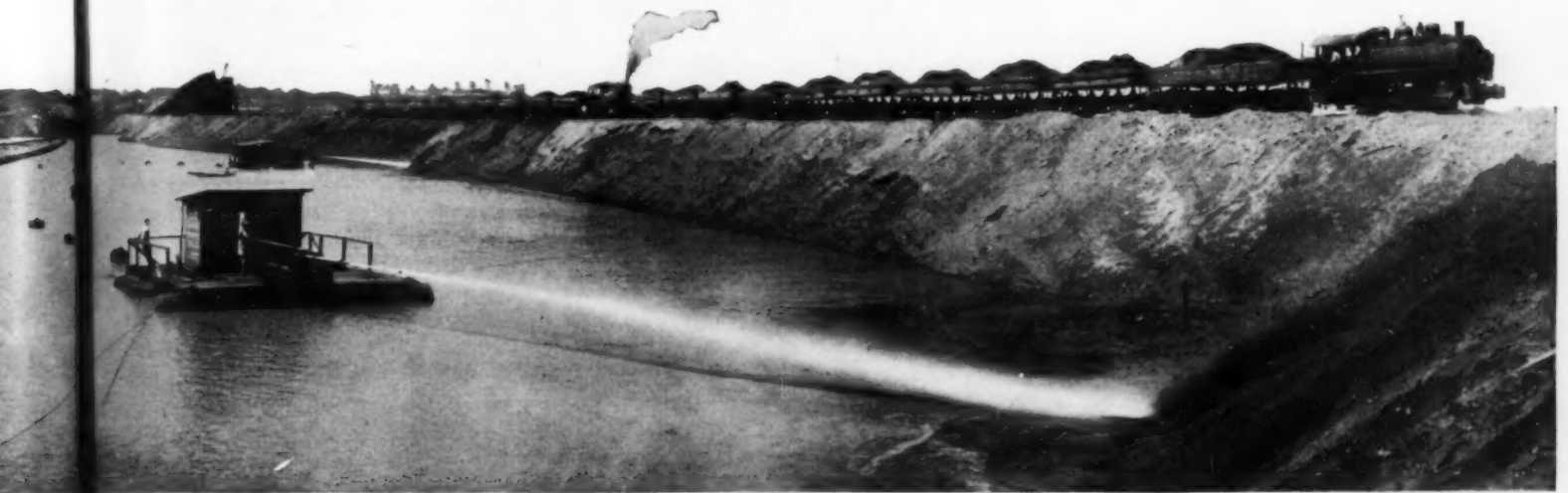
Dikes for Core—The next step was



TYPICAL BORROW PIT indicating character of material used in embankment. Note vertical face of cut back and, ahead of shovel, material loosened by light powder charge.

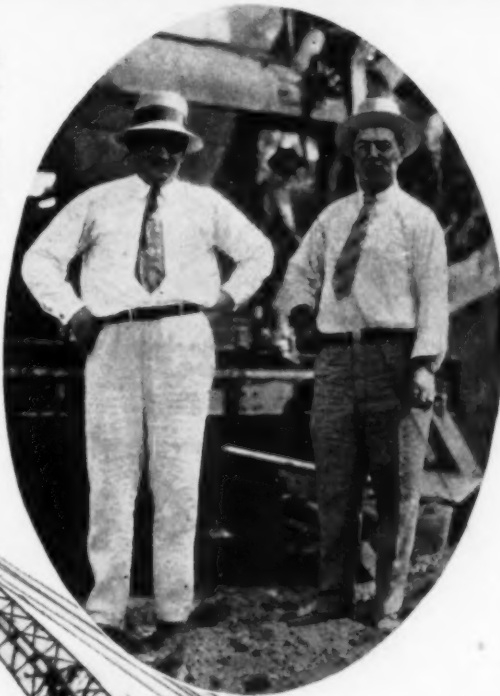
11,000,000 Cu. Yd. for RIVER DAM

TRAINS (below) are dumping from tracks side-shifted from an embankment level of the downstream dike established on a second-lift trestle. Center pond is segregation pool, at this time about half the ultimate length of $1\frac{1}{4}$ miles. Hydraulic giants segregate dumped fill.



to place two embankments across the lower elevations of the site, one at the downstream and the other at the upstream toe of the core. Between them a pool was formed by pumping in water so that operations might start on the core. The size of this pool gradually increases as the height of the enclosing embankments is raised; it will eventually be more than $1\frac{1}{4}$ miles in length.

After reaching the stage where work on the core might start, the sequence of operations has since consisted in



TURNING NIGHT INTO DAY. More than 50 standard 500-cp. portable electric flood-lights enable contractors to get the same output on night shifts as on day shifts. Cheaply mounted, easily moved, these sturdy lights are shifted by two men. Wiring connections quickly made with the current on by men using rubber gloves. (In oval) N. D. URQUHART (left), construction engineer for W. S. Barstow & Co., Inc., and H. O. FIROR, in charge for the Arundel Corporation.

raising the embankments on the upstream and downstream sides of the pool and in puddling the core in place between these embankments. The material for the core and for the embankments on both sides of it is obtained from nearby borrow pits, located ideally for the most economical results.

Borrow Pits—Excavating operations are conducted simultaneously in four main borrow pits. One of these is located on each side of the valley upstream from the dam. The other two are on the two sides of the valley below the dam. The material is excavated from the borrow pits by three 4-yd. steam shovels, a Marion and two Bucyrus, and four other Marions ranging from $1\frac{1}{2}$ to $2\frac{1}{2}$ yd. in capacity. These shovels are served by trains of ten to twelve 12- and 16-yd. dump-



cars handled over standard-gage track by 40- and 60-ton steam locomotives.

The first borrow pits were located at elevations which permitted all loaded train operations to be on slightly favorable grades to the point of dumping. This idea has been followed right through as the various lifts of the embankment have been placed. As soon as a height is reached in a portion of the fill that puts the borrow pit serving it below the new dumping elevation, a new pit at a higher level is opened. All four borrow pits are thus stepped up

toward the center line of the dam. The location of these trestles and the methods of placing the materials by means of them is one of the fine points of the work.

The trestles for the fills that have been built thus far average 25 ft. in height. They have been constructed from local timber and embody no special features of design. They are filled to the stringers and left in place. The track then is shifted to extend the fill toward the center line of the dam by side dumping.

trains, the trackage is arranged so that there is a minimum of delay at the shovel and practically no stoppage of loaded trains en route, the empties all taking the sidings. The timing on each set-up also is such as to permit just time enough at the dump between trains for the crew there to clean up. In other words, the object is to keep the shovel always operating at capacity, with just enough train service to provide a slight surplus of cars.

Hydraulicking—One of the features of the job is the placing of the immense puddled core. This has to be done not only with extreme accuracy, but also in such manner as to keep the height of the core in the right relation to the height of the two enclosing embankments. Fortunately, the material from the borrow pits can readily be segregated hydraulically as it is dumped in the embankment. This is done by giants with 2-in. nozzles mounted on floats in the pool between the embankments. Each float carries a two-stage Morris centrifugal pump driven by a 100-hp. Westinghouse motor. These units furnish 750 gal.



HYDRAULIC GIANT (above) playing on face of embankment washes freshly dumped material into segregation pool. **SEGREGATION OF MATERIAL** (right) dumped from trains obtained in pool by hydraulic giants to form puddled core. Note flow of clay away from gravel just below the level where the stream hits. Above is seen exposed surface with fine material washed off.



the rather steep sides of the valley in such manner that loaded trains always have the grade advantage. Deposits of satisfactory material far in excess of the requirements of the job permit this plan to be followed.

Dumping Trestles—In general, each new lift of the two embankments enclosing the core of the dam is placed across the site from trestles. As soon as the fills thus placed close from the opposite sides of the valley, the material is side-dumped from the trains

Haulage and Track—The layout of the track and the organization of the train movements between the borrow pits and the embankments is another factor that has contributed to the records obtained. There are no special features in any of this track arrangement. There is no complicated control of train movements. The set-up of each borrow pit with the embankments it is serving is taken as a problem by itself. Allowing for reasonable efficiency in operation of the shovels and

of water per minute at 125 lb. pressure. The floats are held in place by cables lengthwise of the pool and are moved along these cables by manipulating to take advantage of the reaction of the pressure of the stream from the giant.

Segregation of Material—As the material is side-dumped from the cars on the track on the embankment the stream from the hydraulic giant is played against it to separate the clay from the sand and gravel. The slope

of the embankment is so maintained that the clay flows into the core, while the other materials are deposited in the enclosing dikes. Constant check is kept on the borrow pit material and on the results obtained in the segregation pool in order to insure the proper density of the core.

Six of the pumping outfits on the floats are in service. Under normal conditions three work along each side of the segregation pool. All six, requiring a total of 900 hp. are supplied with electric energy through a power line carried on floats the length of the

16 ft. 2-in. planks. About every 100 ft. the floats are anchored on both sides by cables attached to concrete blocks large enough to hold the line in place.

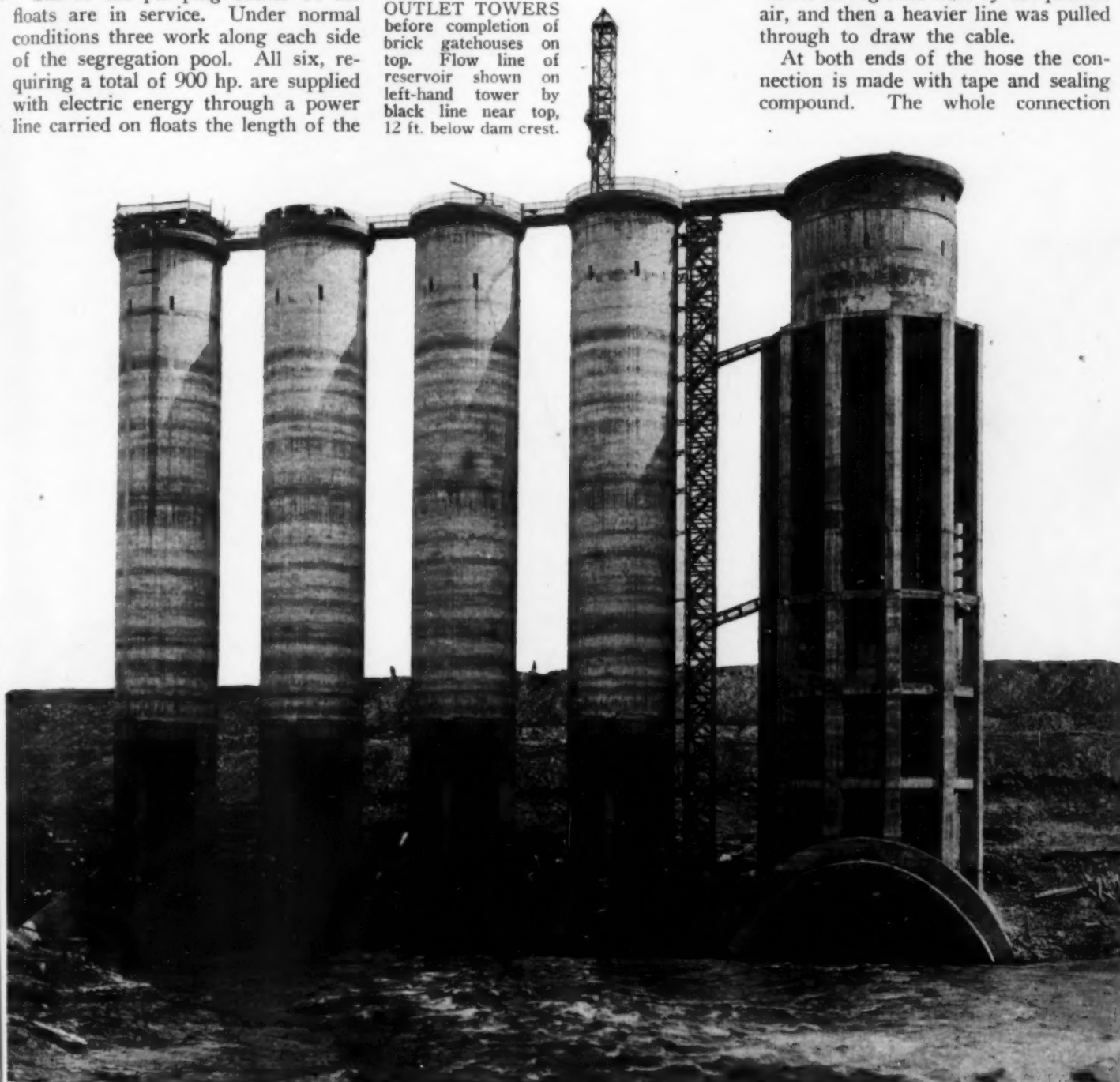
Power is delivered directly to the pump motors at 2,300 volts. This relatively high operating voltage for a

to a line to the floating pumping plant.

From the take-off the power line is carried to the pumping plant on the float in a 2-in. continuous hose supported by gasoline drums. These hose sections are 250 ft. in length with a 1-in. stranded cable drawn through them. A chalk-line twine was first blown through the hose by compressed air, and then a heavier line was pulled through to draw the cable.

At both ends of the hose the connection is made with tape and sealing compound. The whole connection

OUTLET TOWERS
before completion of brick gatehouses on top. Flow line of reservoir shown on left-hand tower by black line near top, 12 ft. below dam crest.



pool. The details of this power line have greatly simplified the handling of this part of the job.

Power Line—Each bent of the power line (see photo p. 38) is carried by two 55-gal. steel gasoline drums. The two 16-ft. planks, crosswise, form the base of the bent. These planks are lashed to the drums with light U-bolts. The bent consists of 2x4-in. lumber. The bents are spaced apart with two

job of this kind reduced the size of the wire required and thus cut down the weight to be carried by the floating line.

Take-offs for the pumps are located on every seventh to tenth bent; one of the pictures on p. 38 shows the details. Three ordinary transformer jacks are attached to the top cross arm of the bent on the floats. Leads from these feed through a relay switch connected

thus formed is constantly exposed to severe moisture conditions but no trouble has been experienced in operation. When the plant gets beyond the range of a take-off, the switch and the branch line in the hose are moved to the next take-off.

Illuminating Night Work—Work on the project is conducted continuously six days and nights each week. In spite of the exceptional amount of wet

weather there has been comparatively little delay since the plant was installed. The methods used permit quick resumption after a storm. The complete night illumination equipment installed also has resulted in the night shifts making practically as good records as the day shifts.

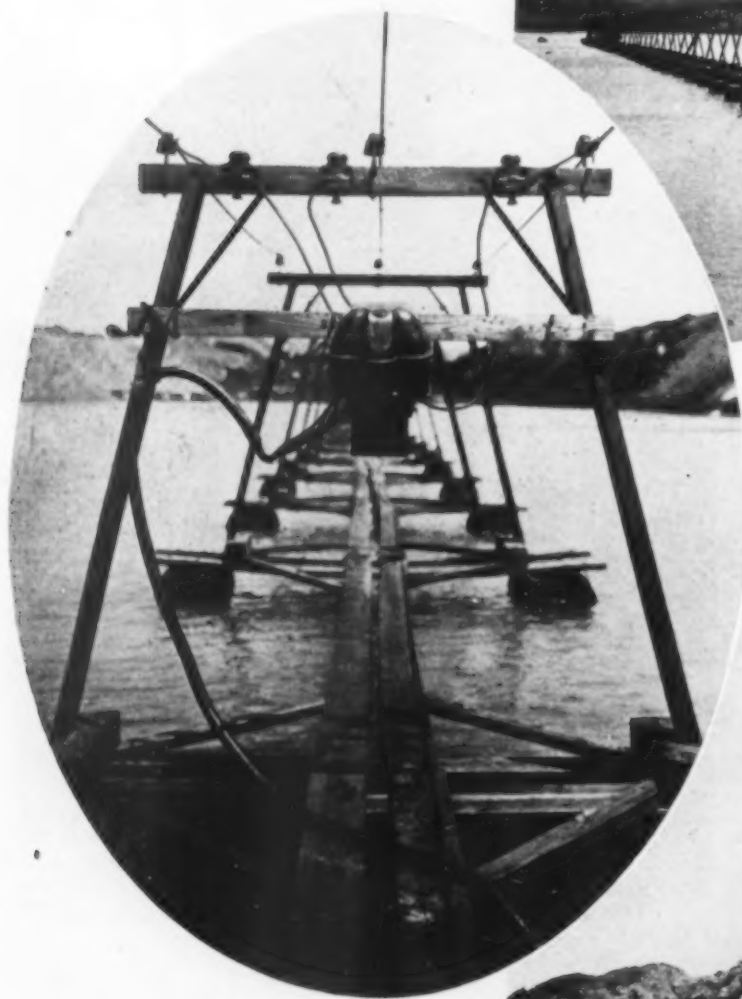
More than fifty 500-cp. General Electric flood-lights are in use most of the time. These are distributed liberally over the job, with the policy that ample light is cheap. Current at 220 volts for the lights is delivered on light pole lines extended where needed. Ordinary insulated outdoor wire is laid

switch and a fuse block. Experience has shown that these are unnecessary. It also has been found that the lights will stand much rough handling. It is not uncommon for a light to be knocked over by accident without putting it out of commission.

N. D. Urquhart, of W. S. Barstow, Inc., is in charge of all work of the Lexington Water Power Co. development. The Barstow organization engaged Murray & Flood as engineers, with A. R. Wellwood as resident engineer for the latter firm. A. S.

Crane has been retained by the builders as consulting engineer. H. O. Firor is in charge for the Arundel Corporation.

COMING—The construction story of the world's largest office building, the Merchandise Mart, Chicago



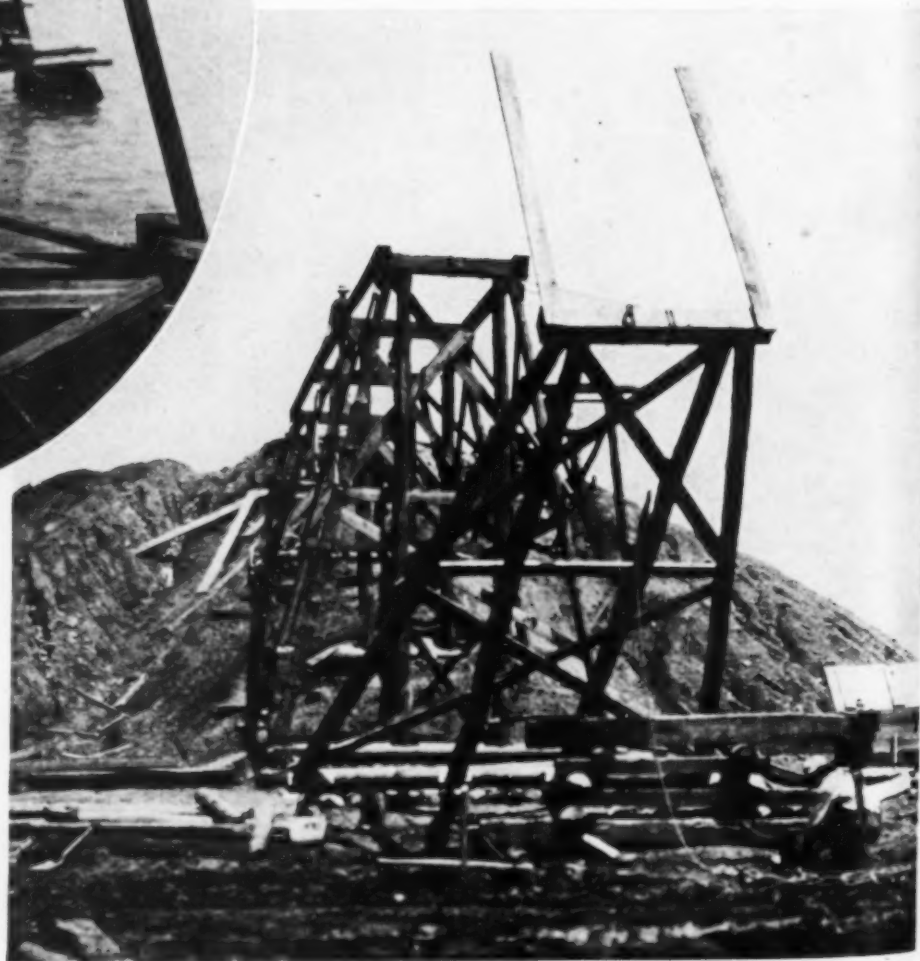
FLOATING POWER LINE (above) delivers current at 2,300 volts to six floating pumping plants. (At left) DETAILS OF TRANSFORMER JACKS and portable relay switch used to plug in at intervals of seven to ten bents for branch line to pumps. Hose carrying ordinary outdoor insulated wire at left.



along the ground loose from the pole line to the point where the lights are in service. It is not uncommon for these branch lines to be 400 ft. in length. As many as four lights are connected to a single branch. The connections are made and broken with the line "hot," the electrician working with rubber gloves.

Each light is mounted on a simple wooden horse, as shown in the picture on p. 35. It can thus easily be shifted anywhere by two laborers. In fact, the lights frequently are moved several times during the night.

The first wooden horses for the lights were equipped with a knife



TYPICAL PILE BENTS framed from local timber for the more than seven miles of trestle required in building embankments.

Gate Launched on Sliding Ways

FOR the new dry dock of the Todd Shipyards Corporation, Brooklyn, New York, it was necessary to build and launch a steel gate of the box type weighing, when completed, 600 tons. The portion up to and including the main deck was built broadside to and launched from two sets of launching ways with a travel of about 70 ft. before taking the plunge. Its weight under this condition was 420 tons.

The first attempt at launching was

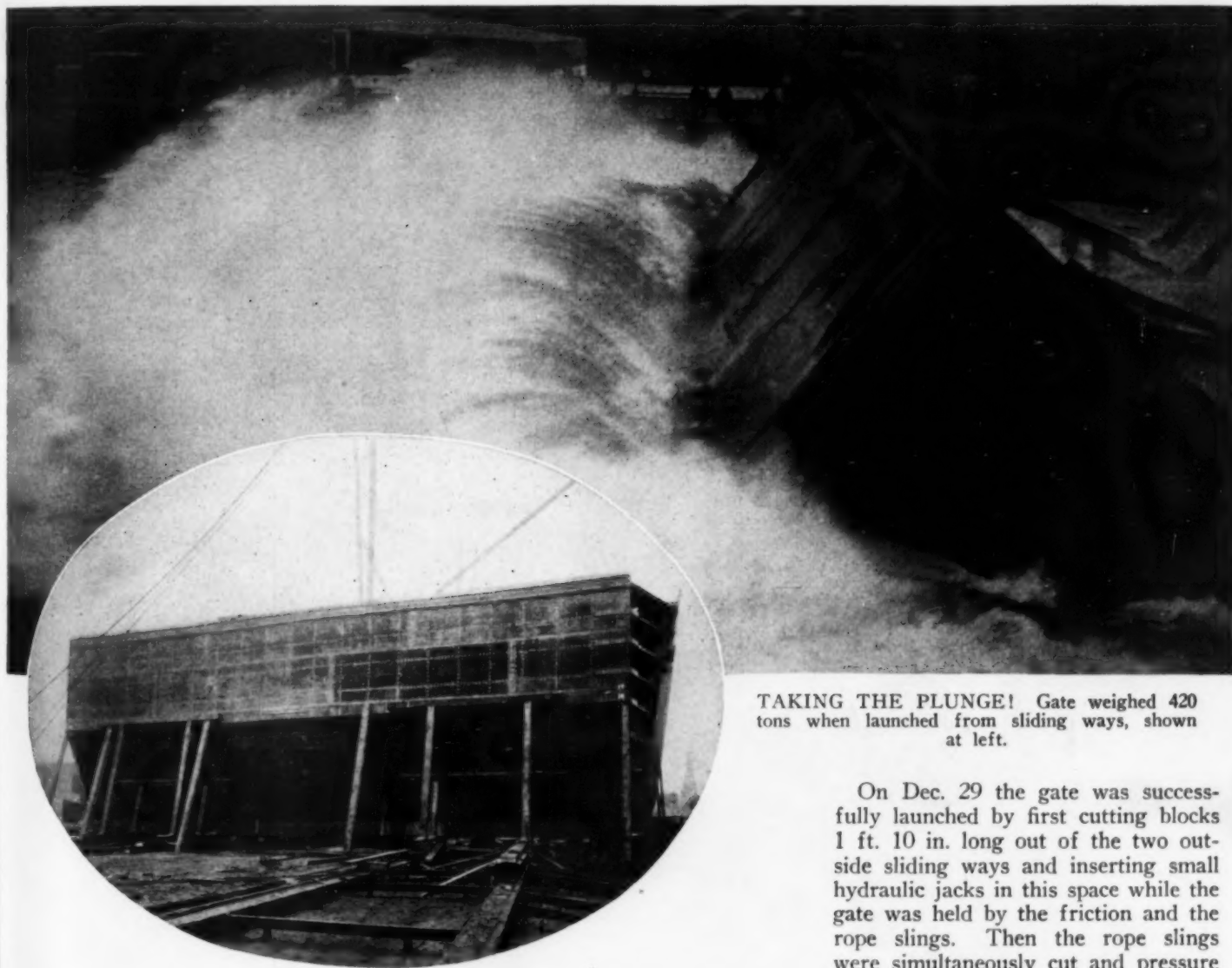
By **FREDERIC R. HARRIS**

*Consulting Engineer,
New York, N. Y.*

eration was properly performed on one side, but the person in charge on the other side, through a misunderstanding of the order, failed to cut the rope on his side. The gate, therefore, was held fast on one side, while the other slid off the ground ways and came to rest when the sliding ways

Two plates separated by a layer of grease and graphite at the low end acted as a pivot while the high end was made to slide on the girder beam until the gate was again brought perpendicular to the ground ways.

New and properly braced sliding ways then were built under the gate, the two outside sliding ways were bolted to the ground ways and the two inside ways were secured by 8-in. Manila rope slings to which first a load of 8 to 10 tons had been applied.



TAKING THE PLUNGE! Gate weighed 420 tons when launched from sliding ways, shown at left.

On Dec. 29 the gate was successfully launched by first cutting blocks 1 ft. 10 in. long out of the two outside sliding ways and inserting small hydraulic jacks in this space while the gate was held by the friction and the rope slings. Then the rope slings were simultaneously cut and pressure applied to the outside ways by the jacks which set the gate in motion, taking the water as shown. The photograph in the oval was taken after the first attempt at launching.

The gate was designed by the author, who also directed the relaunching, and built by the Todd Dry Dock Engineering & Repair Corporation. A. F. Lipari was in charge of computations and design, and Thomas Hoyer served as resident engineer.

made Nov. 24, 1928. The gate was made to rest on four ground ways through sliding ways and was held by bolting the two outside sliding ways to the ground ways and lashing the two inside ways to the ground ways with 12 strands of 3-in. Manila rope.

When all was ready the two outside sliding ways were sawed off. Then the lashings of the rope on the inside ways were to have been cut. This op-

bore on the pile caps, the gate making an angle of about 74 deg. with the ground ways. The keel at the low end was about 24 in. above the pile caps and on the high end about 33 in.

To relaunch the gate, it was necessary first to raise the low end by inserting 16 in. H sections, 247 lb., under this end and making the high end rest on a 26-in. Bethlehem girder beam, 151 lb., inset below the keel.

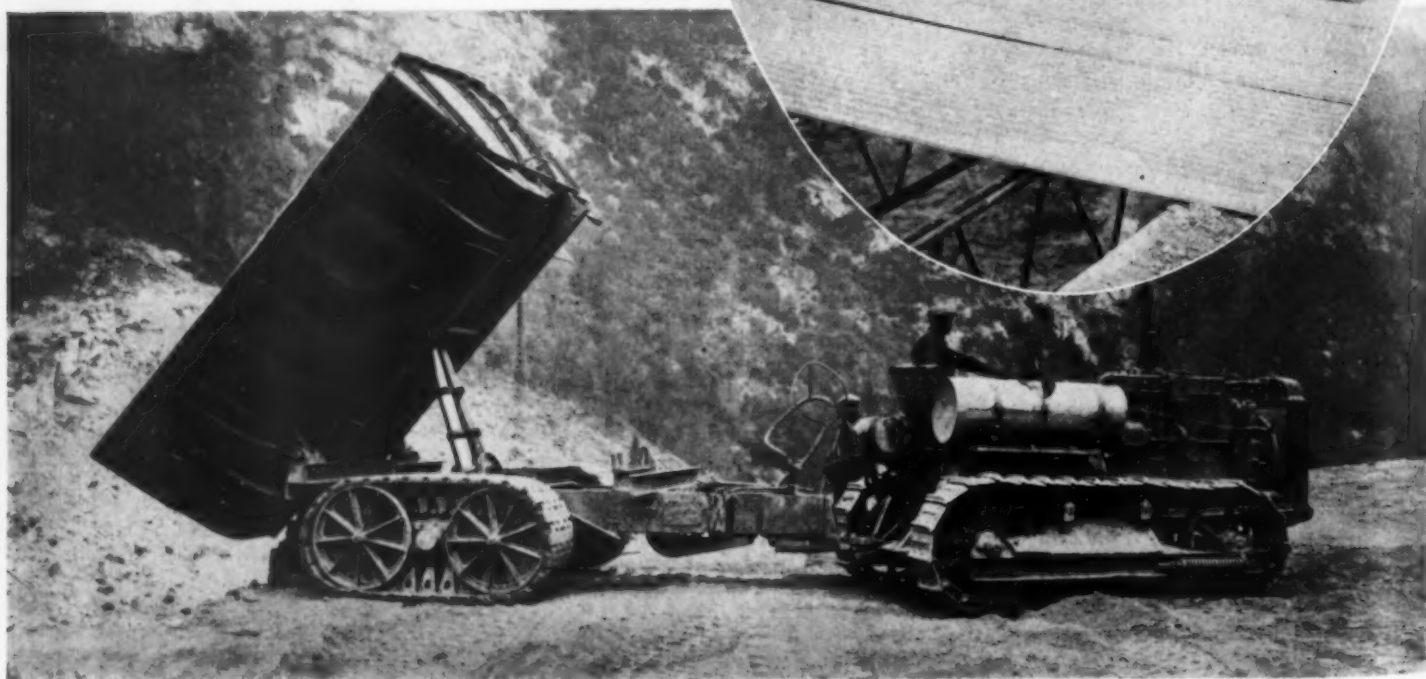
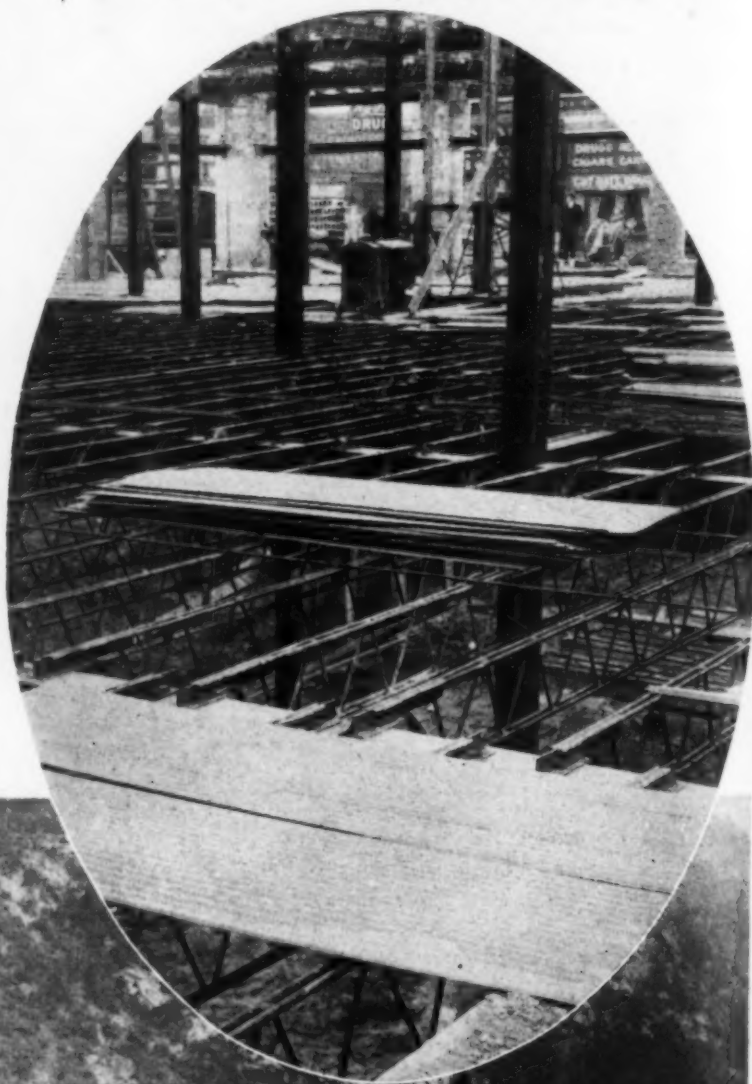
Getting Down to DETAILS

Close-up Shots
of Job
Methods and
Equipment



RUBBER-TIRED BUGGY, employed by Spring Valley Water Co., San Francisco, carries worker who applies protective paint coat to joints of steel water pipe from 16 to 36 in. in diameter.

CORRUGATED STEEL SHEETS (*below*) serve as forms and reinforcement on Massillon steel bridging for concrete floor of Terminal Arcade, Detroit



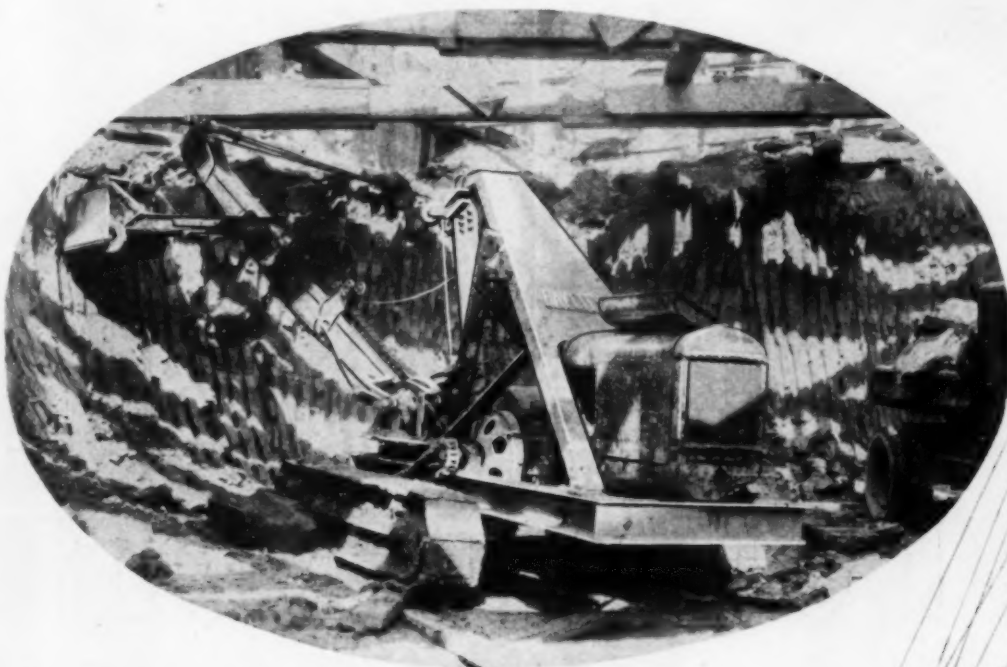
ROCK FILL for Salt Springs dam, California, involving dumping of 3,000,000 yd. of granite, is being handled by tractor-operated 20-ton Athey dump cars with special steel bodies. Cars are loaded by 4-yd. electric power shovels. The dam, to be 320 ft. high and 1,300 ft. long on its crest, is being built as part of the Pacific Gas & Electric Co.'s power development on the Mokelumne River.



AUTOMATIC DUMP HOIST for reinforcing bars used by Turner Construction Co. on U. S. Appraisers' Stores building, New York (O. Johnson, superintendent). When



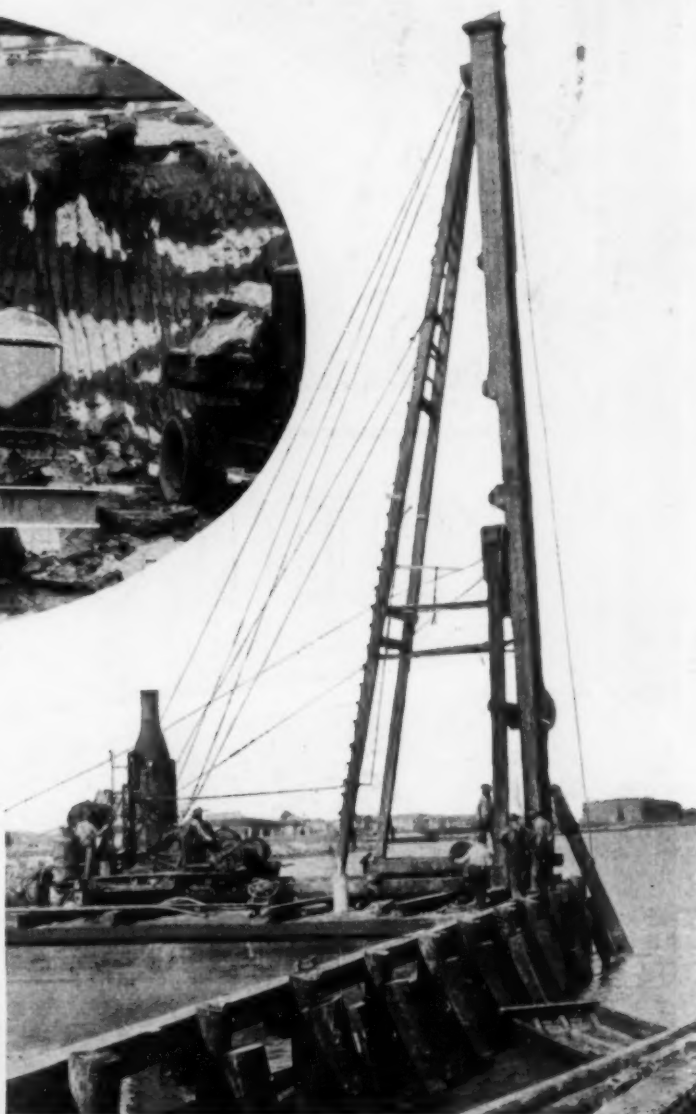
elevator reaches top of guide posts, hinged inside board of V-shaped trough drops, allowing bars to roll down incline to storage platform.



LOW BRIDGE. Here is a Bay City tractor shovel with special short boom (12 ft.) and $\frac{1}{2}$ -cu.yd. bucket excavating with low clearance under timbering for Detroit-Canada tunnel. The machine, powered by a McCormick-Deering tractor, is digging out gummy blue clay for Colwell Bros., who are handling excavation for the Mark R. Hanna Co., Detroit general contractors. The outfit handles 260 truck loads of $1\frac{1}{2}$ to $1\frac{1}{4}$ cu.yd. per 10-hr. shift.



SHOULDER-BUILDING MACHINE proves effective on Illinois highway work. Among the advantages claimed for it are reduced cost of operation, simplicity, and accuracy of line and grade in completed work.



FOR PULLING PILES at Port Arthur (Tex.) Pleasure Pier bridge this rig proved effective. The device consists of a regular pile driver equipped with a heavy timber A-frame back of the leads. Pulling is done by tackle from drum of hoisting machine, with reaction of pull taken by A-frame.

Photo from

H. C. BALDWIN

President, Spence & Howe Construction Co.
Port Arthur, Tex.



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CANTON O.
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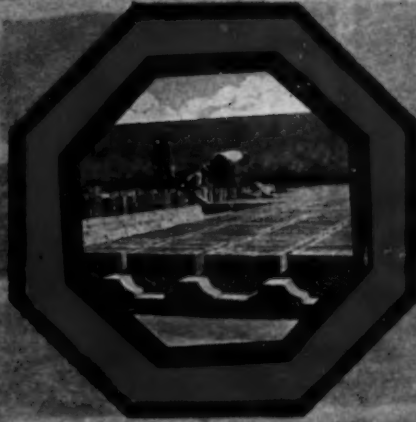
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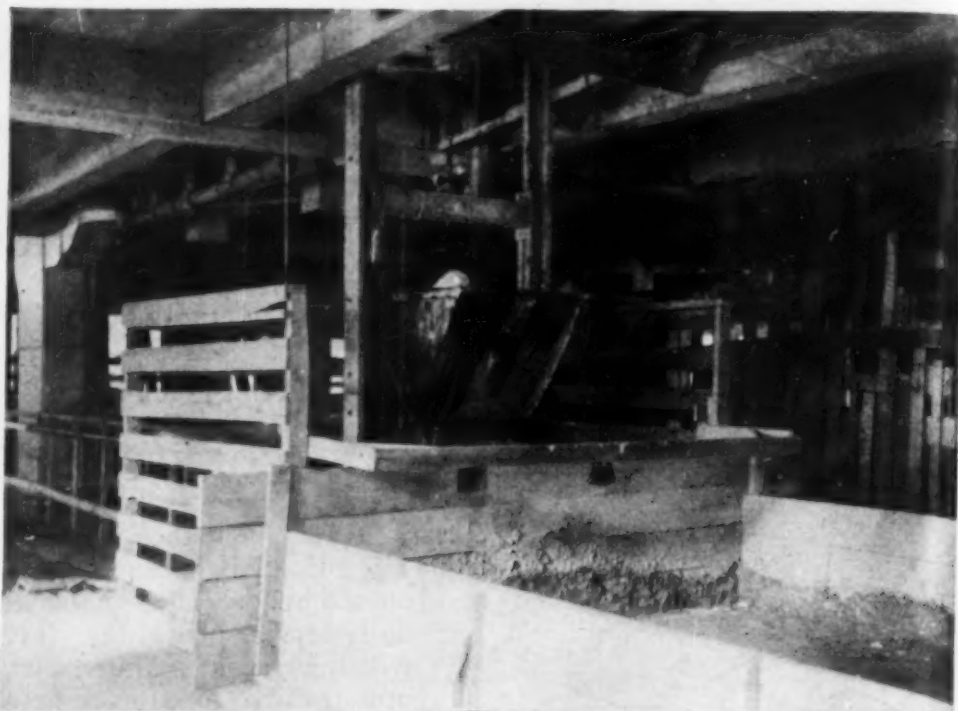
Metropolitan, Bessemer and Olean offer the utmost in high grade paving block, facilities for volume production and location that is geographically central to a large area east of the Mississippi. If you want more roads paved next year, and for many years to come, start now with any of the three brands named.

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Examples of SAFETY

DWIGHT P. ROBINSON & CO., general contractors on the Lincoln Building, New York City, have adopted and devised a number of protective measures for safeguarding workers on the building. Many of the devices have long been recognized as essential to the safety of the workmen. F. J. Carew, superintendent on the Lincoln Building, has been particularly thorough in having his assistants design and install protective devices which are simple, practical and substantial at every place where danger of an accident can be eliminated or minimized by these means.



1 BARRICADE around mortar hoist and swivel guard extending 2 ft. into mortar box. The guard prevents a man from putting his head or arm into the hoistway while he is working in the box.



3 SWIVEL GATE at brick hoist shaftway in open position. The gate is 2 ft. from the edge of the opening, as required by New York State building code.

2 HOD HOIST PROTECTION (*below*). Note guard around cable. By placing slats vertical it is possible to get three pieces from 16-ft. board with no waste. Swivel gate is 2x4.



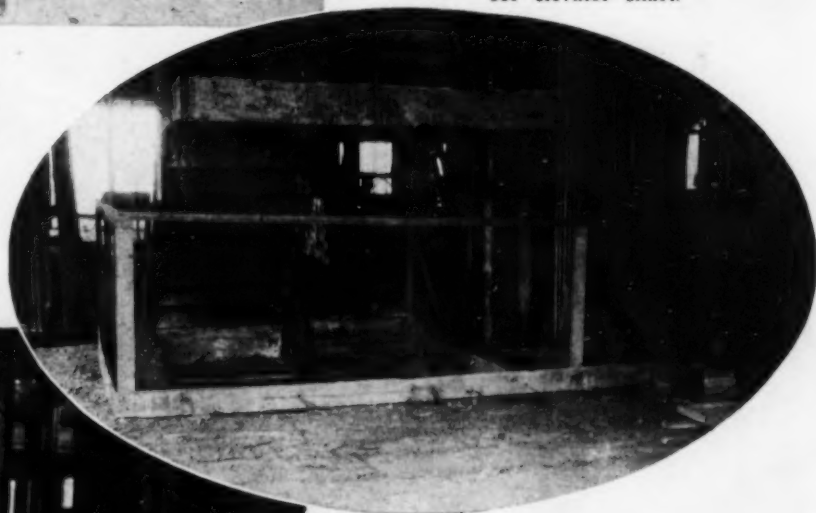
in Building Construction



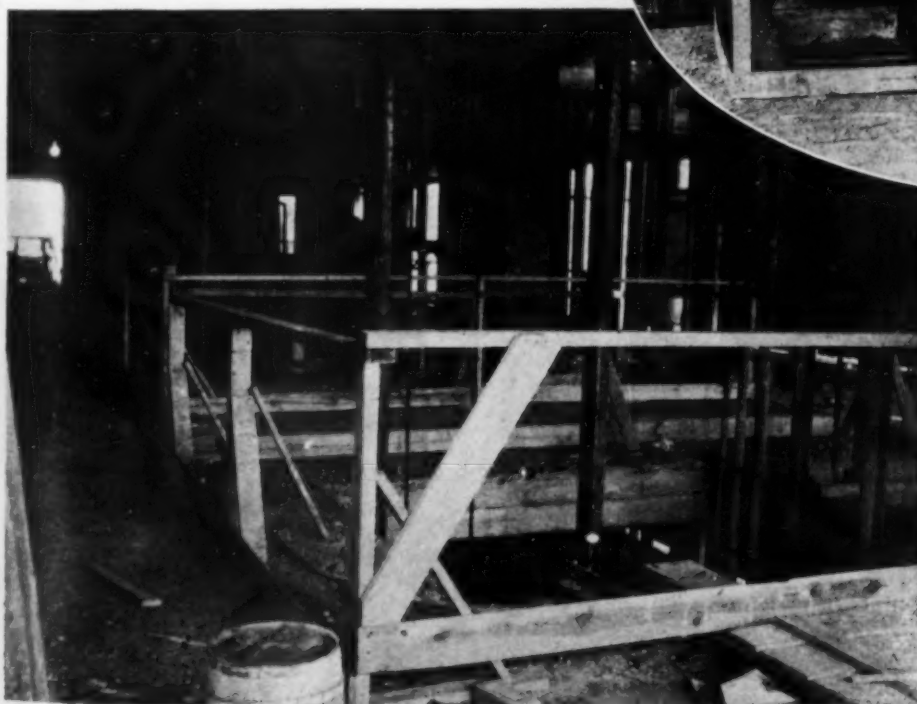
4 HANGING SCAFFOLD (*above*) used in shaft by bricklayers to build all shaft walls. Safer than plank scaffold. The shaft is covered with planks two floors above scaffold to catch anything falling from above and also is covered two floors below to catch objects dropped from scaffold.



6 TEMPORARY DOOR PROTECTION for elevator shaft.



7 PROTECTION AROUND STAIRWELL. Top rail (2x4) keeps men from stepping into opening, and toe board stops bricks or other objects which might be knocked or kicked into well.



5 GUARD RAIL around open shafts, similar to that around stairwell in photograph No. 7.

More Photos Wanted—

Here are a few examples of how safety principles are *actually applied* on the job. They should interest every superintendent and foreman.

Similar photos of accident prevention measures on *your* work are wanted. Mail pictures to the Editor of *Construction Methods*.

Suspension Cables Replaced AMBASSADOR

WHEN numerous breaks continuously occurring in the new heat-treated wire of the Mt. Hope bridge cables, as described in the July issue of *Construction Methods*, made it necessary to dismantle this bridge and to replace the cables, the McClintic-Marshall Co., engineer and contractor for another suspension structure on which spinning of cables with the same kind of wire had just been finished, decided to demolish these cables also and to substitute cold-drawn wire of established safety for the new and untried type. Less than a dozen breaks had been found in the wires of the second structure, the Ambassador Bridge across the Detroit River, when this decision was made. At that time the stiffening trusses had been 12 per cent erected, and the cables were stressed to about 25 per cent of the designed load.

Description of Bridge—The Ambassador Bridge is a privately owned highway toll structure between Detroit,

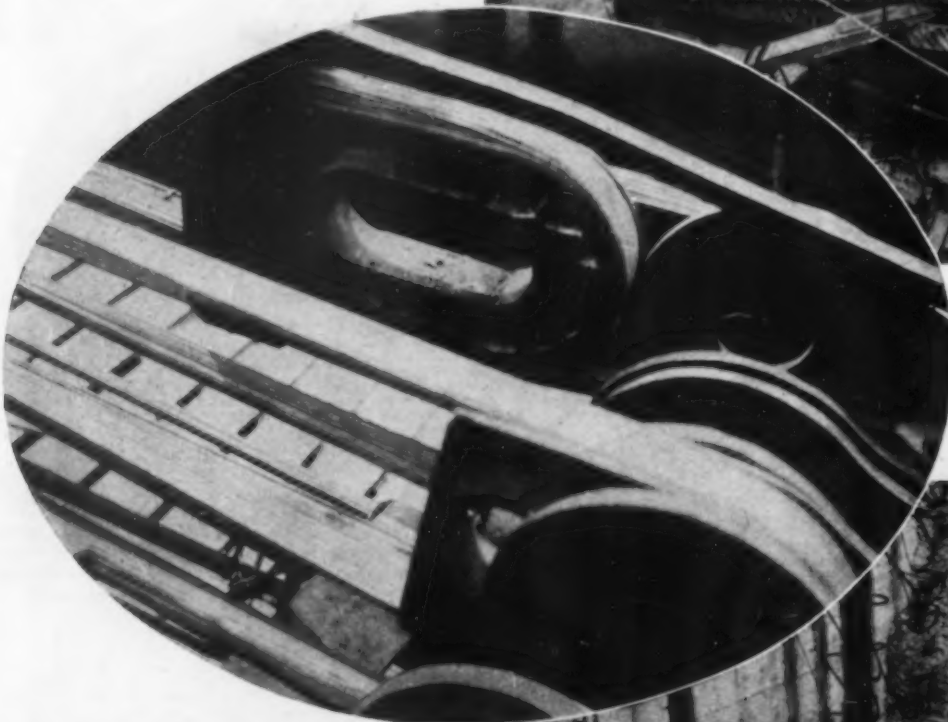
side the distance is 972 ft., and on the Canadian side, 817 ft.

The two cables, 18½ in. in diameter, were placed 67 ft. apart c. to c. Each cable consisted of 37 strands of 206 galvanized wires. The wire was No. 6,

having a diameter of .192 in. before galvanizing. As a matter of fact, the wire ran slightly under weight, and about 56 additional wires were distributed among the 37 strands of each cable to give the required cross-section.



REMOVING EYEBAR PIN from strand shoe. The shoe has been pulled back several inches to release the pressure on the pin. One eyebar has dropped, and the workman is driving the pin back to let the second eyebar fall. The jacking apparatus, with the tube connecting the cylinder to the pump, can be seen.



STRAND SHOE moves clear of anchorage eyebars as jack is released.

Mich., and Sandwich, Ont. It has a main span of 1,850 ft. with 152-ft. clearance at the center of the span and 135-ft. at the towers. The saddles on the towers are 380 ft. above mean water level. Street layout under the structure on the two shores caused the adoption of unequal distances between towers and anchorages: on the U. S.



to Safeguard BRIDGE

tional area. The cable weighed 760 lb. per linear foot.

When work was ordered stopped, erection of the lower chord and part of the floor system had proceeded 350 ft. out from each tower, and the footwalks

AMBASSADOR BRIDGE during removal of the cables. U. S. shore at left.

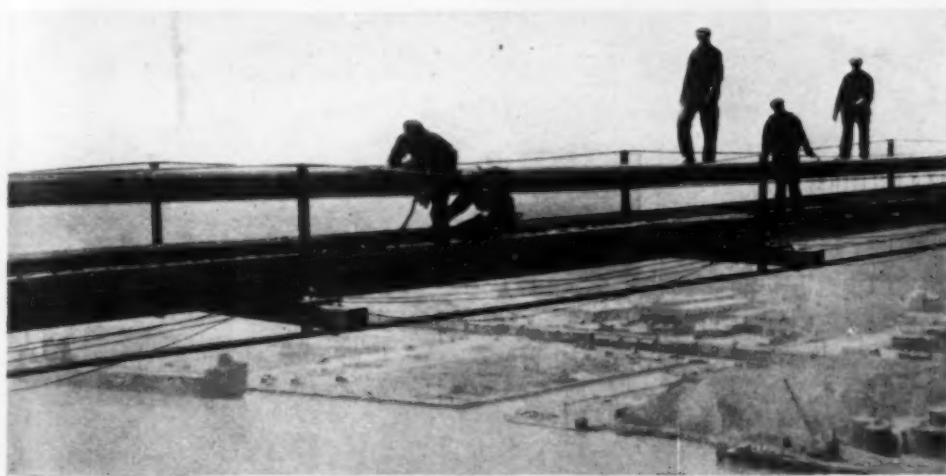


the four 2-in. cables under each footwalk were replaced and the walks were pulled up as far as the main cables

would permit by pulling back on the 2-in. supporting cables with a 40-ton jack at each anchorage.

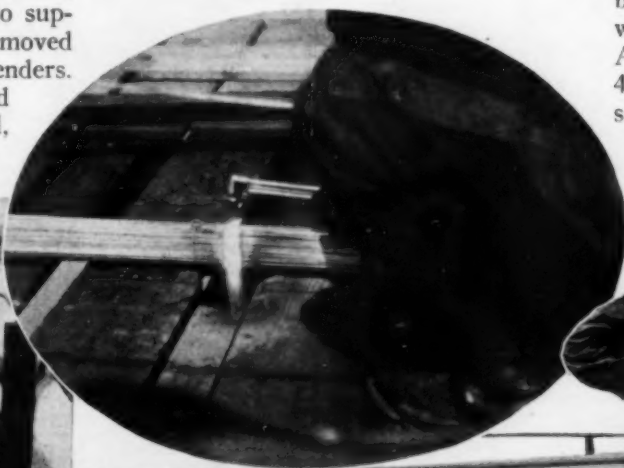
Dismantling Cables—The demolition method, in essence, consisted of pulling back the strand shoes at the anchorages to lift all the wires of one strand clear, seizing the strand with wire at about 6-ft. intervals, lowering it on to the footwalk, burning it into sections, and removing the sections. Anchorage eyebars of the Ambassador Bridge had been installed on edge, as is common practice, and had been buried in concrete almost up to the strand shoes. Before starting jacking operations, it was necessary to expose the strand shoe eyebars for their full length. Ingersoll-Rand pneumatic paving breakers were used to cut out about 600 cu.yd. of concrete at the four anchorages.

Pulling a Strand—After suspenders, bands, and protective wrapping had been removed from the cable, jacking was started with one of the top strands. A 40-ton hydraulic pulling jack with a 42-in. run was used at each end of a strand. Each jack was pin-connected



STRAND is lowered to footwalk as jacks are released.

had been hung from the main cables, the 2-in. cables formerly used to support the walks having been removed and cut up for use as suspenders. After the derrick travelers had dismantled the structural steel,



SEIZING the wires of a strand which has been pulled clear of the cable.



PORTABLE BURNING OUTFIT on sled as used on main span. One tank placed above the other to reduce width. (In oval) Making first cut in strand, center of main span.

to two hooks which were pinned around the lower heads of the strand shoe eyebars. The end of the runout rod was attached, by cable and two pin-connected steel arms, to a yoke placed against the flat face of the strand shoe. Both jacks were run out to full length when being installed to pull a strand, and they took up about 60 in. between them in raising the wires clear of the cable.

After the wires had been seized, the jacks were released, and the strand was lowered on to the footwalk. A strand laid on the footwalk depressed the walk about 2 ft. from the main cable. On the main span, the operator of a portable oxyacetylene outfit carried on a sled cut the strand into sections approximately 30 ft. long by burning it at

SLED used to carry one end of strand sections on main span.



MAKING A CUT near the splay point to release the shoe. Splay casting on this (U. S.) side has been replaced with cable wrapping.

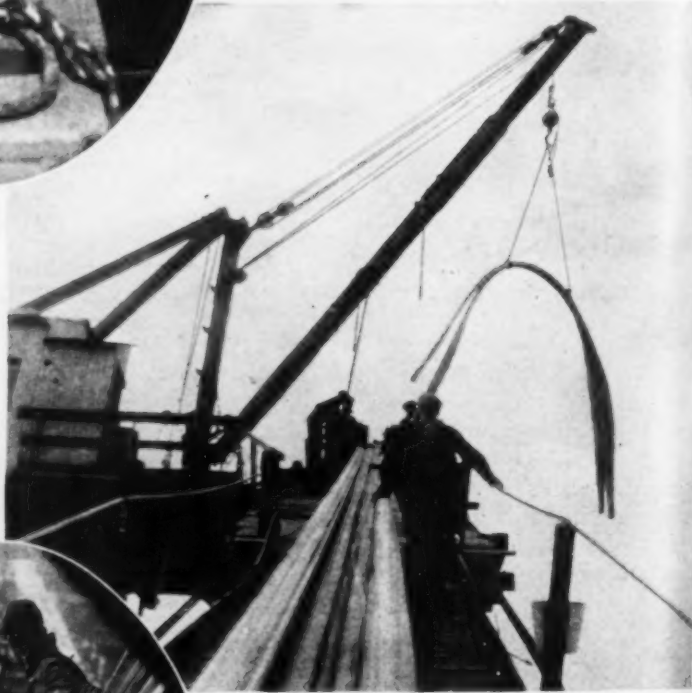
spaced holes in the walk. The first cut in each strand was made at the center of the main span, and the operator worked from the center toward the towers. All strain had to be off the strand when the first cut was made so that the walk would not receive a sudden jar when the strand parted.

Cut sections of the main span strand were hauled up the walk, two at a time, on a pair of improvised wood sleds. The load was pulled by a wire rope wound on the drum of a power hoist placed on top of the tower. A stiff-leg derrick on the tower picked up the strand sections from the sleds and lowered them. The derricks were operated from hoists at the base of the tower. At the U. S. tower the sections

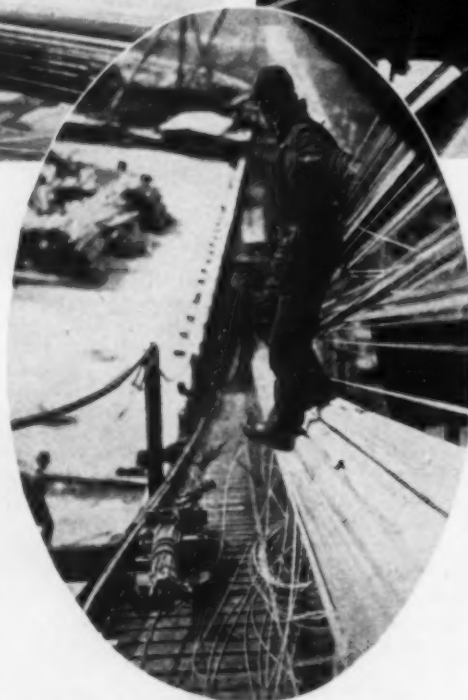
were dropped directly into railroad cars; but at the Canadian tower, which is offshore, they were lowered to a hand car and were pushed ashore over a trestle before being transferred to motor trucks.

Side-Span Methods—The original plan for removing the side-span strands had been to cut them into 30-ft. sections by burning at spaced holes with an oxyacetylene outfit pulled up the walk from the anchorage to the tower. Danger of burning men below and of starting fires with hot sparks caused a change of plan.

By the method as revised, the first cut in the side-span strands was made midway between anchorage and tower. A cable was clamped to the lower half of the side-span strand at this point,



STIFF-LEG DERRICK on tower lifts strand sections from sleds and lowers them to cars. Each tower has two derricks.



SLED carries rear end of half of side-span strand. Strand is held back on its descent by cable from hoist on tower. Good example of gnarled strand in one being pulled (at man's back), with tangle of wires on walk requiring separate burning

and the strand was held back by a drum of the hoist on the tower. All burning into sections was done at a hole 30 ft. from the bottom of the walk. A hoist at the anchorage pulled the strand down the walk the proper distance after each section had been cut and removed. With the first half of the side-span strand out of the way, a cut was made at the saddle, and the hoist on the tower lowered the second half to the bottom of the footwalk, where the spacing and cutting were continued as before. The cable contractor kept a bucket of water under all cutting holes on the side span to catch hot sparks.

After the first cut had been made on a side-span strand, the strand was burned at the splay casting to release

the shoe. The oxyacetylene operator then cut the half-stands at the shoe, and a derrick picked up shoe and hairpin.

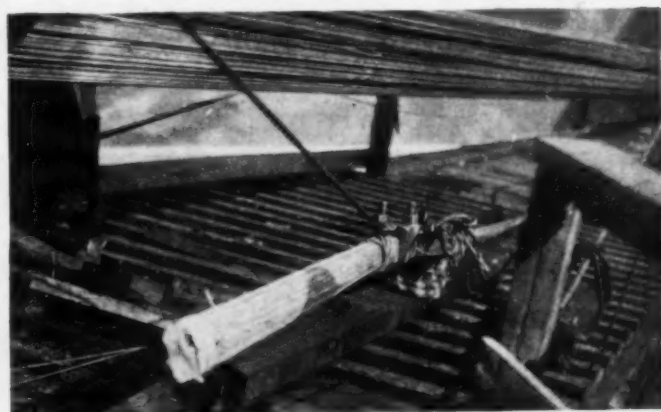
Working Force—Eight crews were employed in dismantling the cables, each having approximately 900 ft. to handle. Seven cross bridges connected the two footwalks, five equally spaced on the main span and one at the mid-point of each side span. The contractor had ten Davis-Bournonville burning outfits distributed over the bridge. Four of them were on sleds on the

main span, four were stationed at the anchorages, and two were placed on the side span cross-bridges. Each cutting crew consisted of three men: the burner, his helper, and a man with water to put out any fires.

Two double-drum hoists were on each tower. One drum of a hoist pulled up the cut sections on the main span footwalk; the second drum held back half of the side-span strand. Each tower, also, was equipped with



CLAMPING HOLD-BACK CABLE to second half of side-span strand before making cut near the saddle on the Canadian tower.



HOLD-BACK CABLE lowers upper half of side-span strand to bottom of walk.



CUTTING upper half of side-span strand near the saddle on Canadian tower.

CUTTING SIDE-SPAN STRAND (above) at hole 30 ft. from bottom of walk. Sections are pushed off edge of walk on to pile, from which they are picked up in bundles by derrick, using spacing bar and three hitches, as shown. Most seizings are rubbed off in pulling side-span strands down the walk. After the wire company had reported difficulty in handling these sections, seized only at the ends, the Keystone State Corp. started to bind them afresh at 4-ft. intervals before pushing them off the walk.



WIRES OF A STRAND pulled clear of main cable to be seized before being lowered on to footwalk. Cross bridge is at center of main span.

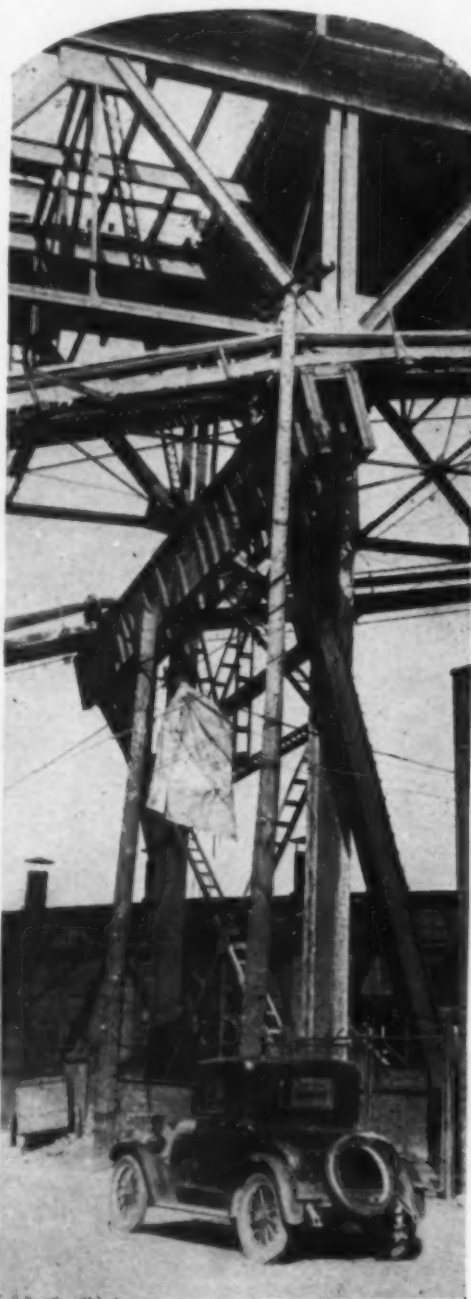
two derricks for lowering strand sections from both walks. These derricks had fixed booms. Hoists at the base of the tower operated the load lines of the derricks and, also, ran the tower elevator used by the men in going aloft and returning.

The difficulty of removing tangled wires which had been squeezed into other strands and which refused to pull clear when the strand was lifted sometimes slowed down the work. In squeezing the cable into circular cross-section after all strands had been spun and seized with metal bands, the bands on the outside strands had been broken while those on strands in the center had remained intact. Thus little seizing was required on some strands in the demolition process, while a few wires of other strands were so inextricably bound together that they failed to separate and had to be burned individually.

Loads on Footwalks—Each footwalk was supported on four 2-in. cables placed in pairs 10 ft. apart. The 6-ft. floor boards were nailed to two 4x12 stringers carried on 8x8 floor beams spaced approximately 27 ft. apart. As a strand weighed approximately 40 tons and a cut section 600 to 700 lb., it was necessary to exercise reasonable caution in keeping the load on the footwalk within safe limits. Hauling more than two sections on the sleds of the main span placed too great a stress on the stringers, which were carrying the load of the strand lying on the walk in addition. If an excessive load, of perhaps two uncut strands, was left lying on the footwalk of the main span near one tower while the other half of the walk carried no dead load, the footwalk would be so distorted from its catenary curve as to bear against the cable near the tower on the unloaded side.

Because the side spans are not of the same length, a temporary bent had been erected on the U. S. side to equalize the saddle movements at the top of the towers. As the saddle on this bent

confined the strands of the cable, the contractor was able to remove the splay casting and its bent. The cable was



TEMPORARY BENT supports side-span cables on U. S. side.

wrapped with wire rope at the location of the splay casting. No temporary bent and saddle having been placed on the Canadian side, the splay casting there was not removed.

The average rate of progress in removing the first forty strands was four strands a day. Thereafter progress was increased to six strands a day.

Those in Charge—Robert MacMinn, assistant chief engineer, and L. L. Martin, erection engineer, are in charge of dismantling and construction operations for the McClintic-Marshall Co. The Keystone State Corp., Philadelphia, is a sub-contractor for the cables. L. N. Gross, engineer and manager, and I. E. Gee, superintendent, supervised the spinning and removal of the cables. R. G. Cone, resident engineer, is in charge for Modjeski & Chase, consultants to the Detroit International Bridge Co., owner of the structure.

Skyscrapers

RESULTS of a survey made by the Thompson-Starrett Company disclose some interesting facts regarding skyscrapers in the United States. There are in this country 4,778 buildings 10 stories or more in height; of this number only 377 are more than 20 stories high. Of buildings 20 stories or more in height New York has 188, Chicago 65, and Philadelphia 22. There are 4-n buildings in the country taller than 500 ft., and five others in the course of construction. The highest is the Woolworth Building, New York, whose 792 ft. have not been surpassed in 16 years.

These laurels, however, will soon pass to the Chrysler Building, New York, now under construction to reach a height of 808 ft. above the sidewalk. Even this record will be of short duration for the Bank of Manhattan Building, New York, will extend skyward a distance of 836 ft., making it the tallest building in the world.

JOB ODDITIES

A Page of Unusual Engineering
and Construction Features



A NEW DIET is being enjoyed by this Insley power shovel used by A. O. Hagerty, contractor, of Lafayette, Ind., to dismantle an old power house at Purdue University. In place of its usual earth and rock fare, it is eating up the job of wrecking a boiler.



A PEGASUS AMONG MOTOR TRUCKS. This 5-ton unit, owned by Atkinson, Kier Bros., Spicer Co., takes flight across the site of the Coolidge dam, Arizona, via the highline cableway.



SHIP AHOY! A marine motif is introduced in the design of this 8-story office building in Hamburg, Germany, reproducing the appearance of a vessel's prow.



ASBESTOS PROTECTED. Caterpillar tractor, fighting oil field fires at Santa Fe Springs, Calif., has gasoline tank insulated against flames which might cause explosion if insulating covering were not used.

Contractor, in Lining Tunnel With Precast Pipe, Performs "Camel-Through-Needle's-Eye" Job

COMPARABLE with the biblical difficulty of passing a camel through the eye of a needle is the present-day task which the Lock Joint Pipe Co., of Ampere, N. J., has successfully accomplished in placing 1,500 lin.ft. of precast concrete pipe having an outside diameter of 100 in. within a tunnel bore measuring from 104 to 108 in., thus allowing a minimum clearance of only 2 in. for delivering and jointing 15-ton pipe sections 12 ft. long. Extreme precision of method and equipment was the keynote of this unusual construction operation, demanding the delicacy and accuracy of a watchmaker not only in transporting the heavy pipe through the restricted limits of the existing tunnel but also in making the extremely close fit between the spigot end of each new section and the bell of the pipe in place.

The job is located at the northerly end of the Wanaque aqueduct which is being constructed by the North Jersey District Water Supply Commission. As originally built, 1,500 lin.ft. of concrete-lined tunnel just below the Wanaque dam was designed to operate under gravity flow. Subsequent

changes in plans by Fuller & McClintock, of New York, consulting engineers on the project, provide for a pumping plant which will put the tunnel under pressure. The tunnel, completed and lined with concrete under a previous contract, had, therefore, to be reinforced and it was decided to do this by placing within the existing bore precast concrete lock-joint pipe, 84 in. in inside diameter and 8 in. thick, reinforced to resist test pressures of 75 lb. per square inch.

The outstanding features of the work are the ingenious equipment and methods which the contractor developed to handle 15-ton pipe sections with extreme precision in restricted

working space. "We almost had to use a shoe-horn," said Superintendent Walter C. Corbett, "to get the pipe through the existing tunnel. It was a tight squeeze, especially at one point where a curve in the tunnel alignment makes a 15-deg. angle."

With clearances of only a couple of inches for transporting the precast pipe within the tunnel, it became necessary to lay and maintain narrow-gage railway track accurately to line and grade. After the track was properly laid on the old invert it was anchored into place with neat cement to prevent movement.

The 12-ft. sections of pipe, with internal and external diameters respectively of 84 and 100 in., are precast at the contractor's yards in Bloomfield, N. J., delivered on railway flat cars, and transferred to a low-mounted 8-wheel carriage, hauled up a grade to the tunnel shaft by a cable (with snatch blocks) from one of the drums of an American locomotive crane. The same crane, with a rated capacity of 10 tons, is made to handle the 15-ton pipe sections by lashing the top of its boom with wire rope to a wooden A-frame over the mouth of the shaft. The



WITH BOOM LASHED TO HEADFRAME 10-ton crane picks 15-ton pipe from 8-wheel car on rails over shaft preparatory to lowering. (Above) COL. F. F. LONGLEY, engineer for Lock-Joint Pipe Co.

crane, thus specially rigged, picks up a section of pipe and after heavy beams carrying the rails over the shaft opening have been slid out of the way, lowers the pipe to the shaft bottom where it is transferred to a special tunnel carriage, equipped with an I-beam needle carrier, pintle and jacks as illustrated in the accompanying sketch and photos.

Tunnel Carriage—The crux of the



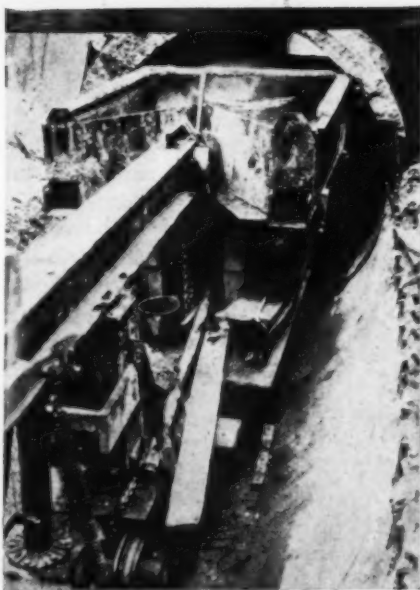
UNLOADING PIPE from railway cars. (In oval) TURNBUCKLES on cables hold pipe securely in transit.



EIGHT-WHEEL CARRIAGE, hauled by cable from crane drum, hauls pipe up grade to shaft head.

job is the design of this tunnel carriage, hauled by a Milwaukee gasoline locomotive. It must be able not only to handle a 15-ton pipe section 12 ft. long, but also, by fine adjustments both vertically and transversely, to maneuver the pipe so as to telescope the joints.

The I-beam needle of the rig is carried by two vertical standards, the one on the forward end being equipped with a Duff jack, ratchet-operated, and a trolley carriage running on the I-beam flanges. The beam is run through the pipe and jacked up to pick up the load by a wood pintle supported at only one point so as to make possible any slight lateral swinging or vertical tilting of the pipe required in

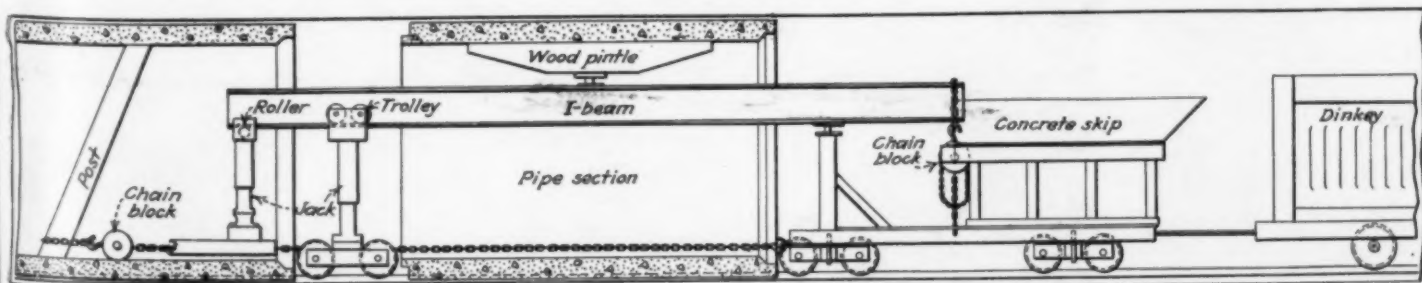


I-BEAM NEEDLE and concrete skip of tunnel car.

which operate on the I-beam flanges.

Now comes the delicate operation of fitting the spigot end of the new pipe into the bell of the pipe in place. This is made possible by having the supporting jack at the front end of the needle beam equipped to move both vertically and laterally for nice adjustment to line and grade. With the spigot lined up to slide into the bell the new pipe section is pulled home to place by chains from a Yale differential block.

With the joint made and the pipe blocked to proper grade, the front jack is lowered, the I-beam meanwhile being held up as a cantilever by a chain block at its rear end. As soon as the rig is moved out of the jointed pipe the trol-



FOR TRANSPORT IN TUNNEL pipe is carried by pintle on needle-beam rig equipped with jacks for accurate centering of bell and spigot joint.

ley jack is run forward on its rollers and extended to support the end of the I-beam on its 4-wheel carriage. The outfit then returns to the shaft for the next pipe.

With the pipe in place, the space between its exterior and the inside of the

tool force the wedge-shaped end of the gasket tightly into place and subsequent blows, acting on the fiber core of the gasket, produce a "mushrooming" effect, upsetting the lead and tightly filling the calking space throughout its entire length. After the gasket is



SPIGOT END of precast pipe showing metal banded surface of lock-joint.



WALTER C. CORBETT, superintendent for the contractor.



PIPE LOWERED to shaft bottom. Rails slide sideways to provide opening.

existing tunnel lining is backed with concrete up to the spring line. This concrete, mixed by a Jaeger machine at the shaft head, is delivered by a skip on the tunnel car, as illustrated. The rails of the narrow-gage line on the tunnel invert are not removed but

are encased with the concrete backfill.

The Lock Joint—A feature of the standard lock-joint is a lead gasket with fiber core, driven to fill the triangular space between the steel-banded surface areas of the bell and spigot. The first hammer blows of the calking

driven home the joint, in which there is a ring of wire mesh reinforcement, is completed by filling with cement mortar which protects from corrosion all metal surfaces in the bell and spigot end sections. All jointing operations are done from the inside of the pipe.



A KID GLOVE FIT. Arrow indicates extremely small clearance for transporting new pipe section through bore of existing tunnel. From left to right, view shows pipe, needle-beam carrier, concrete skip and end of dinkey locomotive.

Column Underpinned and Removed in Grafting Addition to Building

IN MAKING a 12-story addition alongside the Hellman Bank Building, Los Angeles, the P. J. Walker Co., contractor, was called upon to solve a variety of problems in tying the new structure to the old and providing spacious, unobstructed banking quarters by relocating columns, removing interior columns and installing heavy girders to support the column loads of the upper office floors. The work had to be carried on without interrupting the tenancy of the upper office floors.

The first operation consisted in placing two heavy girders, one at first floor and the other at second floor level, to straddle a column that had to be removed. The column was next riveted to the lower girder. Stub columns then were placed to transfer loads above the second floor, picked up by the upper girder, to the ends of the lower girder. To the column, at a point above the second floor, collars were attached to take the thrust of two 200-ton hydraulic jacks seated on the upper girder. These jacks transferred the load of the column to the upper girder, through the stub columns at its ends to the lower girder and through the riveted connections back again to the column below first floor level.

Floor beams then were riveted to the two girders at first and second story levels. With the column thus effectively underpinned, it was burned out between the two heavy supporting girders, giving an unobstructed space for the new banking quarters. The job was completed by fireproofing the revamped steel work with concrete.



INDENTED FACADE of existing building was taken down and brought out flush with front of new addition. (At left) JACKS under collars on column transfer load to heavy girder.

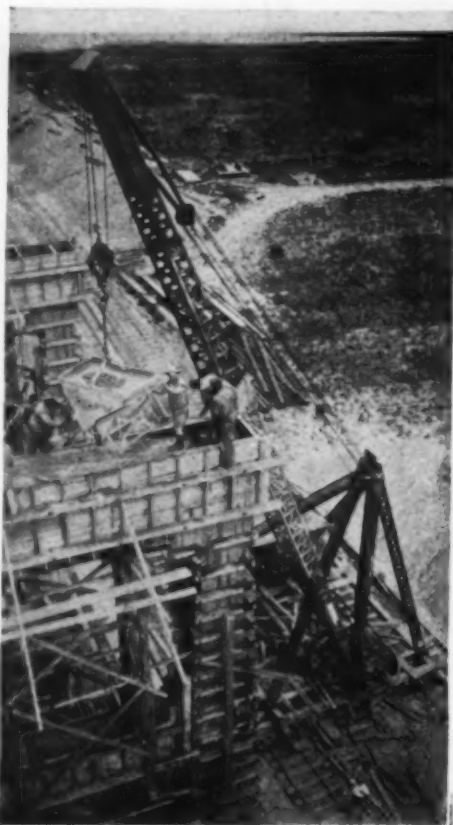
PANEL FORMS FOR BRIDGE PIERS

*Assembled on Ground and Placed by
Derrick or Cableway*

BY D. M. PLYLER

*Engineer, Hardaway Contracting Co.,
Johnsonville, Tenn.*

PANEL forms completely assembled on the ground and set in place by derrick or cableway helped the Hardaway Contracting Co., of Columbus, Ga., speed concreting operations on the approach and river piers of the Trotters Landing bridge, a structure 3,611 ft. long over the Tennessee River at Johnsonville, Tenn., forming part of the main state highway route between Nashville and Memphis. As designed by L. W. Erickson, bridge engineer for the Tennessee Highway Department, the structure consists of fifty 43-ft. concrete deck girder spans and five steel trusses—two of 220-ft., two of 320-ft., and one of 366-ft. span. The width of the roadway is 20 ft. The com-

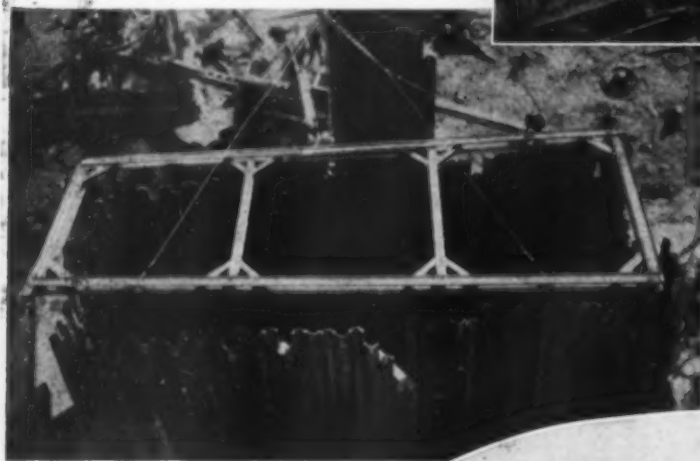


pleted piers reach heights of 70 ft. above their bases.

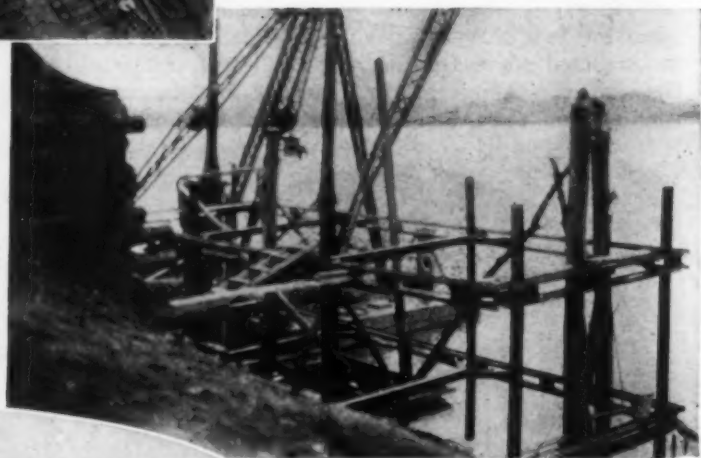
Excavation, erection of forms and concreting for the approaches were handled by two 5-ton American stiff-leg derricks with 84-ft. booms, mounted on narrow-gage railroad trucks. These trucks ran on a pair of parallel tracks spaced 22 ft. apart on centers, thus facilitating the movement of the travelers to any desired position along the approach structure. The approach pier bents are supported on treated timber pile foundations, the piling being driven by an overhead telescoping-lead pile-driver, using a 3,000 lb. hammer.

For the entire job concrete was furnished from a central mixing plant equipped with a 1-yd. Smith mixer and Blaw-Knox batcher plant and inundator. A 5-ton Plymouth gasoline

CAP (left) of concrete pier is poured from hopper bucket on traveling stiff-leg derrick



PANEL of steel framework is lowered to brace cofferdam.



BRACING is placed for one of the river pier cofferdams.



SHEET PILING is driven with aid of traveling derricks.



ON EAST APPROACH excavation and pile driving for pier foundations are nearing completion

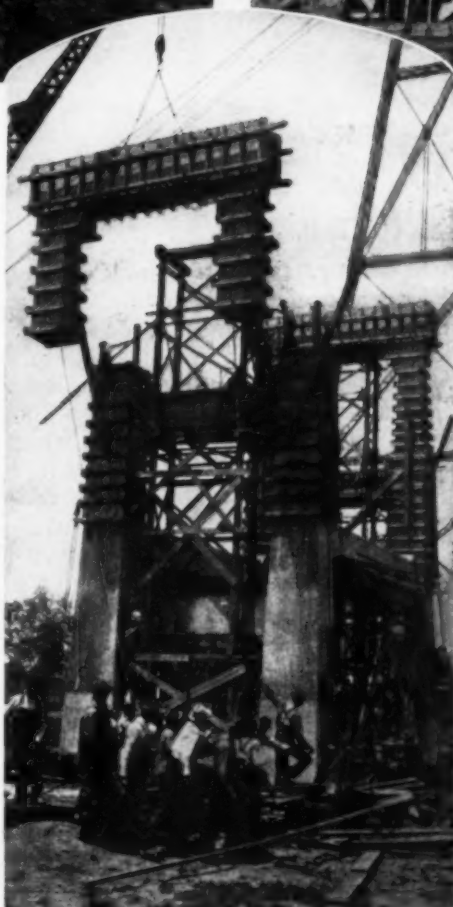


PIER BENTS for approach are taking shape. Note double rail line at right for traveling derrick.

locomotive delivered concrete from the mixing plant to the approach piers. For the river piers, however, concrete was carried and deposited by a 10-ton, 1,600-ft. span cableway, using 2-yd. bottom-dump buckets.

The panel forms for the pier construction consisted generally of 2-in. tongue and groove lumber with 4x6-in. wales. Approach piers were poured in 16-ft. lifts and river piers in 10-ft. lifts. The accompanying photograph illustrates the placing of forms for a top lift, showing the forms for the pier cap handled in a single unit. For centering under the approach decks ten lines of 24-in., 74-lb. I-beams were used; these were carried by structural steel hangers supported on the pier caps.

River piers were carried to an elevation 50 ft. below low water, resting on chert and gravel foundations. They were built by the open cofferdam method, using one line of 65-ft., 14-in. Carnegie arch web steel sheet piling with structural steel bracing. The piles were driven by McKiernan-Terry steam hammers from derrick barges and also from the cableway. As the sheeting was driven down, foundations were excavated by 1½-yd. clamshell



HANDLED AS A UNIT. Forms for pier cap assembled on ground, are placed by traveling derrick. Height of completed pier is 70 ft. above base. On the approach piers, concrete is poured in 16-ft. lifts. Forms for top lifts together with form for pier cap are erected in one piece.

buckets operated from cableway or derrick. When excavation had been completed a concrete seal was poured under water by means of bottom-dump buckets specially built for this purpose by the contractor. The cofferdam was then unwatered and the pier concreting completed.

Sand and gravel for the job were obtained locally from the river bed by means of a 6-in. centrifugal pump delivering to a screening plant mounted on a small barge. The job was located 4 miles from the nearest railroad and practically all other materials were delivered by barge at the bridge site.

The principal quantities involved in the contract were as follows: 20,000 cu.yd. of concrete; 620 tons of reinforcing steel; 35,450 lin.ft. of timber piles; 4,500 lin.ft. of concrete piles; 30,000 cu.yd. of excavation; 1,400 tons of structural steel; and 7,200 sq.yd. of asphaltic wearing surface.

For the Tennessee Highway Department the job was supervised by E. M. Turner, division engineer, and A. B. Breeden, resident engineer, reporting to T. C. McEwen, chief engineer. For the Hardaway Contracting Co., J. M. Money served as superintendent and the writer as engineer.

LIGHT-TRAFFIC ROADS

in North



HAND-RAKING (left) large stones from run-of-pit gravel to the ditch lines of the road.



LARGE STONES raked out to the ditch lines.

USING simple hand tools, a small portable crushing outfit traveling along the work and a $\frac{1}{2}$ -yd. power shovel, light-traffic roads of the state highway system are being gravel-surfaced in the mountains of western North Carolina at a cost of from \$900 to \$1,100 a mile.

The methods used have been developed by H. E. Noell, district engineer of the North Carolina Highway Department. Confronted by insistent demands for an all-weather surface on light-traffic roads, and with limited funds, Mr. Noell could not afford much plant expense. Commercial sources of gravel or other ballast materials within the range of the money available were non-existent. It was thus a case of using local materials.

No glacial gravel exists in this section. There are, here and there, fairly

satisfactory small deposits of stream gravel; it lacks uniformity, but produces good results with the methods followed.

The gravel is excavated and loaded into motor trucks by power shovel. The trucks deliver the run-of-the-pit directly to the shaped-up road surface, without selection or screening, and men with hand potato rakes pull to the ditch lines all stones that will not pass a 2-in. ring. The larger stones, some of which are full one-man size, are thrown to the side and broken by the portable

crushing outfit as it moves along the work. The output of this crusher is spread evenly on the road surface by hand with shovels. No rolling is done; traffic consolidates the first placing and afterward the top dressing of the crushed gravel.

Two crawler-mounted Universal power shovels are in service, one a $\frac{1}{2}$ -yd. and the other a $\frac{3}{4}$ -yd. machine. The latter size has been found best for this work. Mr. Noell considers that a larger machine would lack the portability necessary for the frequent rather long moves required. The shovels are shifted from pit to pit on a standard 5-ton motor truck.

The number of trucks used depends on the length of haul. Mr. Noell has found that 6-cylinder Chevrolet dump-trucks are best for this service. He also has found after considerable experience that he can rent trucks for less than the department can own them. There has been no difficulty in getting an ample number of trucks at \$10 per 10-hour day. On each job the rating of the number of loads constituting a day is made and a truck must make that number to get a day's pay. All delays of over 30 min. for any reason are deducted from the pay of the trucks.

The number of men used in raking and casting out large stones at the point where the trucks dump on the road varies somewhat with the propor-



RAKING the large stones out of the ditch line to feed to the traveling crusher.

GRAVELED AT LOW COST

Carolina

TYPICAL SECTION of completed road (right) after a few weeks in service.



FEEDING CRUSHER by hand shoveling.

tion of the gravel that has to be removed. The crew usually can spread the loads and separate the gravel as fast as it is delivered. Occasionally they fall behind. When that happens a lull in the arrival of trucks permits them to go back and finish separation on hastily passed over stretches.

The portable crushing outfit consists of a No. 0 Aurora jaw crusher, mounted with a Buda gasoline engine on a special under-cut four-wheel steel-frame truck. This outfit is pulled along the road by a light tractor.

When in operation the crushing outfit proceeds along one side of the road, leaving the other side open for traffic. The windrowed stones are raked and forked from the ditch lines by hand, to avoid mixing soil with them. The stones are then thrown on to the charging platform of the crusher. A potato fork is used to handle the smaller sizes, while the larger ones are lifted up by hand. A steel hammer is used to break up the larger rock before feeding it to the crusher.

Two men working directly back of the crusher spread the reduced material as fast as it is discharged. These men acquire quite a bit of skill in roughly building shoulders and in accurate spreading of the thin layer of crushed gravel.

With a crew of eight men and a foreman this portable crushing outfit

puts the top dressing of crushed gravel on from 700 to 1,000 ft. of road averaging about 16 ft. in width in 10 hr. The depth of the top dressing runs from 1 to 2 in., depending on the amount of coarse gravel. The total depth of the gravel surfacing ranges from 5 to 8 in., according to the character of the subgrade.

For two or three weeks after the top dressing of crushed gravel is added the road is scraped with an Adams leaning-wheel blade grader, drawn by a

motor truck. Smoothing with a road drag is entirely avoided, since experience shows that the blading gets much better results. The crushed gravel is found to bed and set in the road surface much better than round stones do.

Upwards of 47 miles of secondary mountain roads have been surfaced by Mr. Noell in the manner described. Some of this mileage is in use after three years' service without any further treatment than careful maintenance. All of it forms an excellent progressive step in surfacing, with bituminous treatment taking hold in good fashion when added later. In most cases growth of traffic justifies surface treatment the following season.



DISTRIBUTING RUN OF CRUSHER to the road surface. Second man from the right is throwing large stones into the crusher.

BELT CONVEYORS *Deliver*

BELT conveyors, hung from horizontal latticed steel booms pivoted to sliding frames on hoist towers, constitute the outstanding feature of the construction plant which Winston Bros. Co., contractor of Minneapolis, is using to place concrete in the Diablo dam, a constant-angle arch structure 386 ft. high forming one unit in a series of reservoirs and power developments on the Skagit River for the city of Seattle, Wash. The dam, 140 ft. wide at the base, 16 ft. at the crest and measuring 586 ft. along the arch

(curved to a radius of 382 ft.) requires the placing of 316,000 cu.yd. of concrete.

In adopting the belt conveyor system for concrete placement the contractor was largely influenced in his choice of type of equipment by the fact that the city engineering department's specifications called for a fairly dry mix (3-in. slump) and prohibited the chuting of concrete into place. Under these restrictions the general scheme of depositing concrete was worked out by the Winston organization using 24-in.

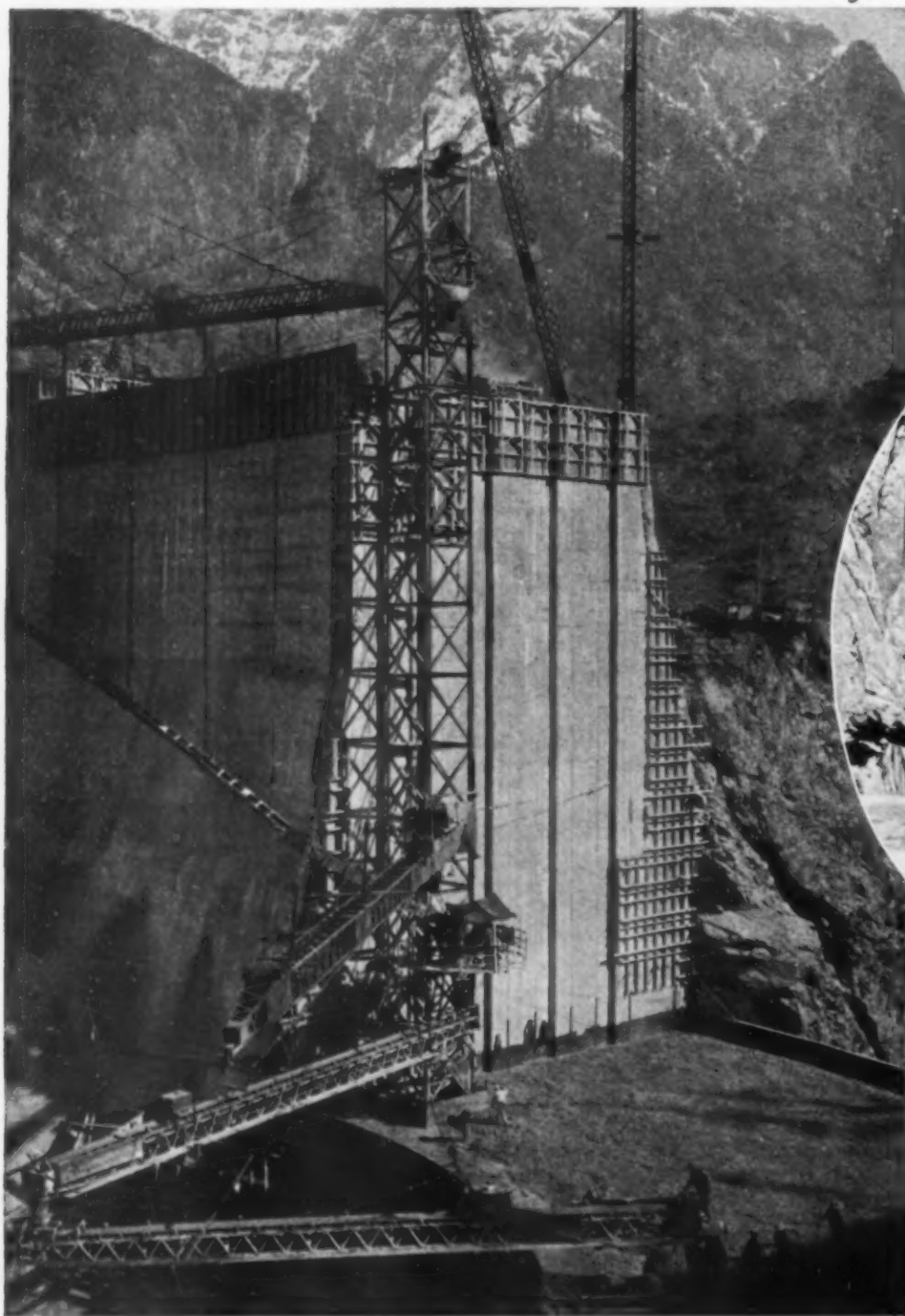
Photos and data from

E. D. ALEXANDER

*Resident Engineer, Diablo Dam,
Seattle, Wash.*

Link-Belt portable conveyors rigged as illustrated in detail in the accompanying sketch and photos. Two of these concrete placing plants were installed.

The main supporting boom, 98 ft. 8 in. long, is hung from the tower by three pairs of plow steel cables. From this boom, pivoted at one end to swing through an arc of 197 deg., are suspended two portable belt conveyors, in tandem, 65 ft. 8 in. and 60 ft. 7 in. long, respectively. The outer conveyor is hung from a 4-wheeled trolley running on an I-beam track on the supporting boom so that the discharge end of the conveyor may be moved in or out to deposit concrete at the point desired. Three Ingersoll-Rand air



BELT CONVEYORS, hung from horizontal boom attached to sliding frame on hoist tower, deliver concrete to place in dam.



W. H. GARDINER (left), resident manager, and F. T. HILLMAN, chief engineer, for Winston Bros. Co.

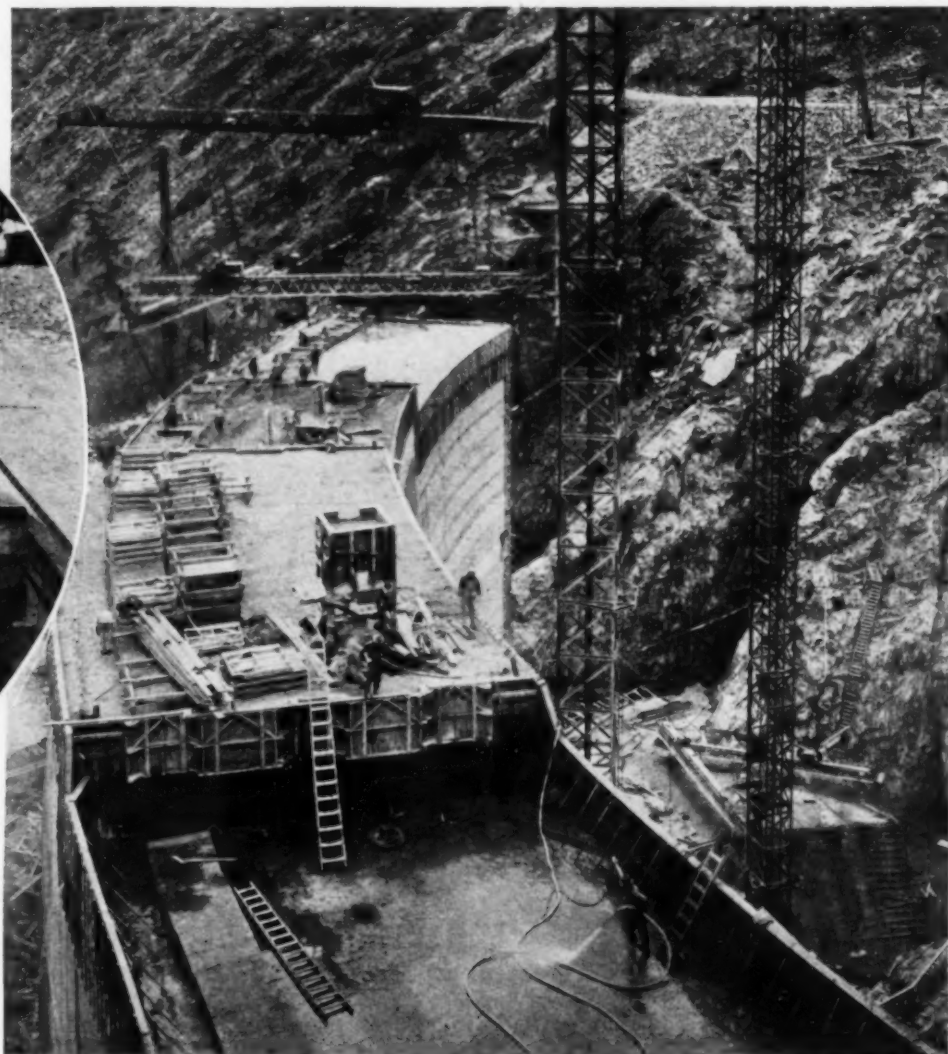
hoists supply power through tag lines for swinging the main boom and running the trolley in or out by means of an endless cable. A hand crab lowers or raises the outer or discharge end of the second conveyor, the limit of vertical movement being 8 ft.

The conveyor system, specified to deliver 80 cu.yd. of concrete per hour, actually deposits 100 cu.yd. per hour,

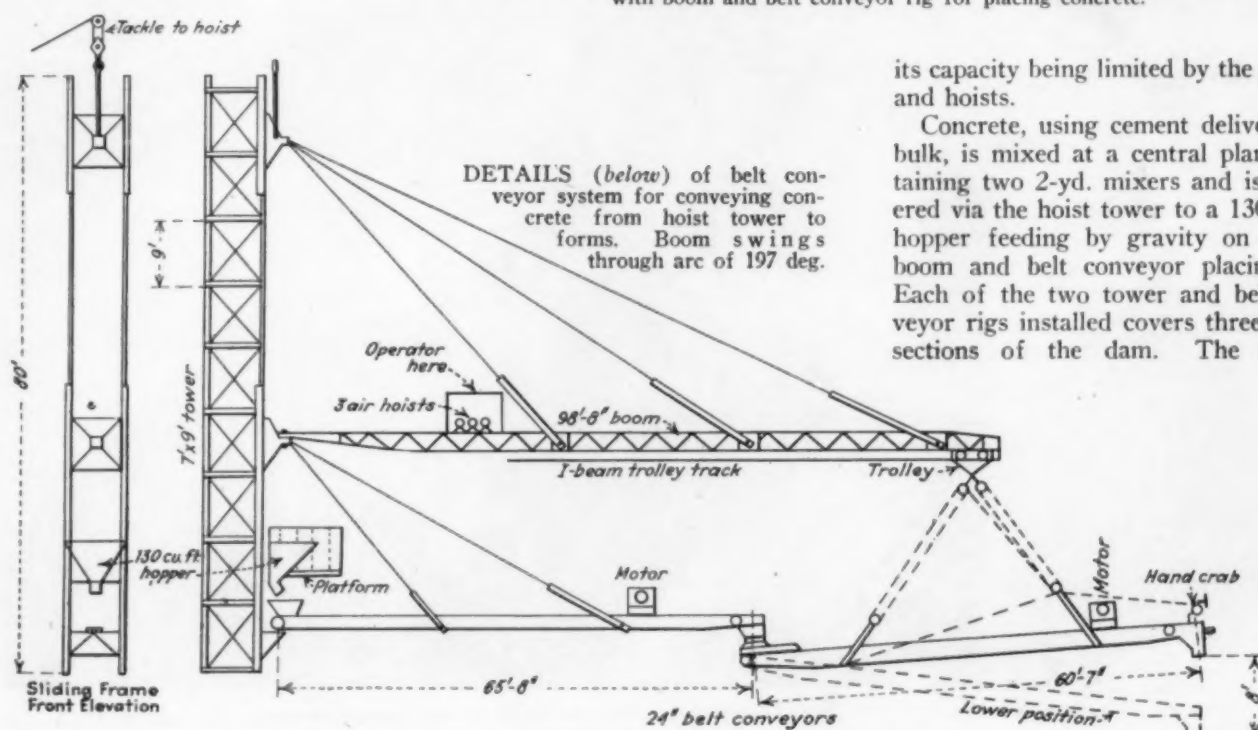
Concrete for DIABLO DAM



E. D. ALEXANDER (left), resident engineer, "reaches for a 'Lucky' instead of a sweet"—and gets it from RALPH KENNAN, assistant superintendent for Winston Bros.

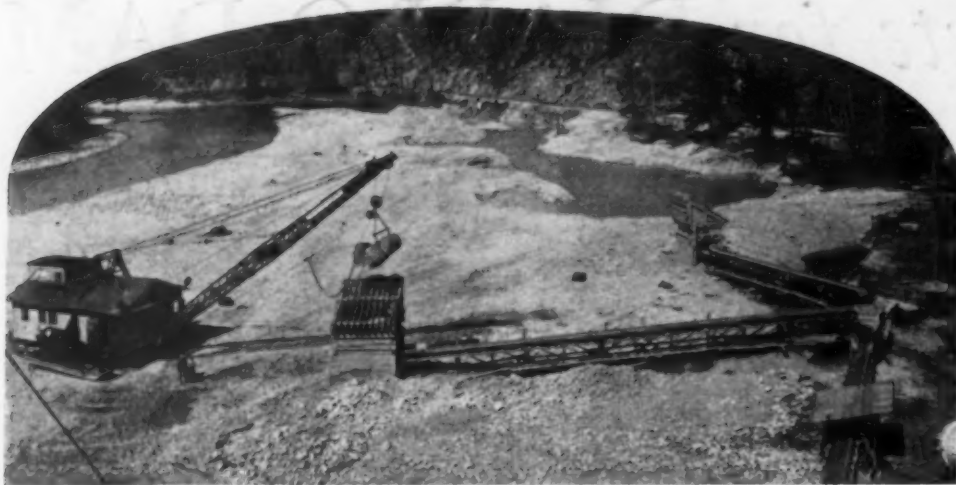


FORMS in place for concreting new section of dam. In background is tower with boom and belt conveyor rig for placing concrete.



its capacity being limited by the mixers and hoists.

Concrete, using cement delivered in bulk, is mixed at a central plant containing two 2-yd. mixers and is delivered via the hoist tower to a 130-cu.ft. hopper feeding by gravity on to the boom and belt conveyor placing rig. Each of the two tower and belt conveyor rigs installed covers three 75-ft. sections of the dam. The arched



FOR HANDLING AGGREGATES contractor used dragline, grizzly and belt conveyors delivering to screening plant.

portion of the dam is divided into eight equal sections. The two towers, as now used, cover only six of these sections, the end sections being poured by derrick and bucket.

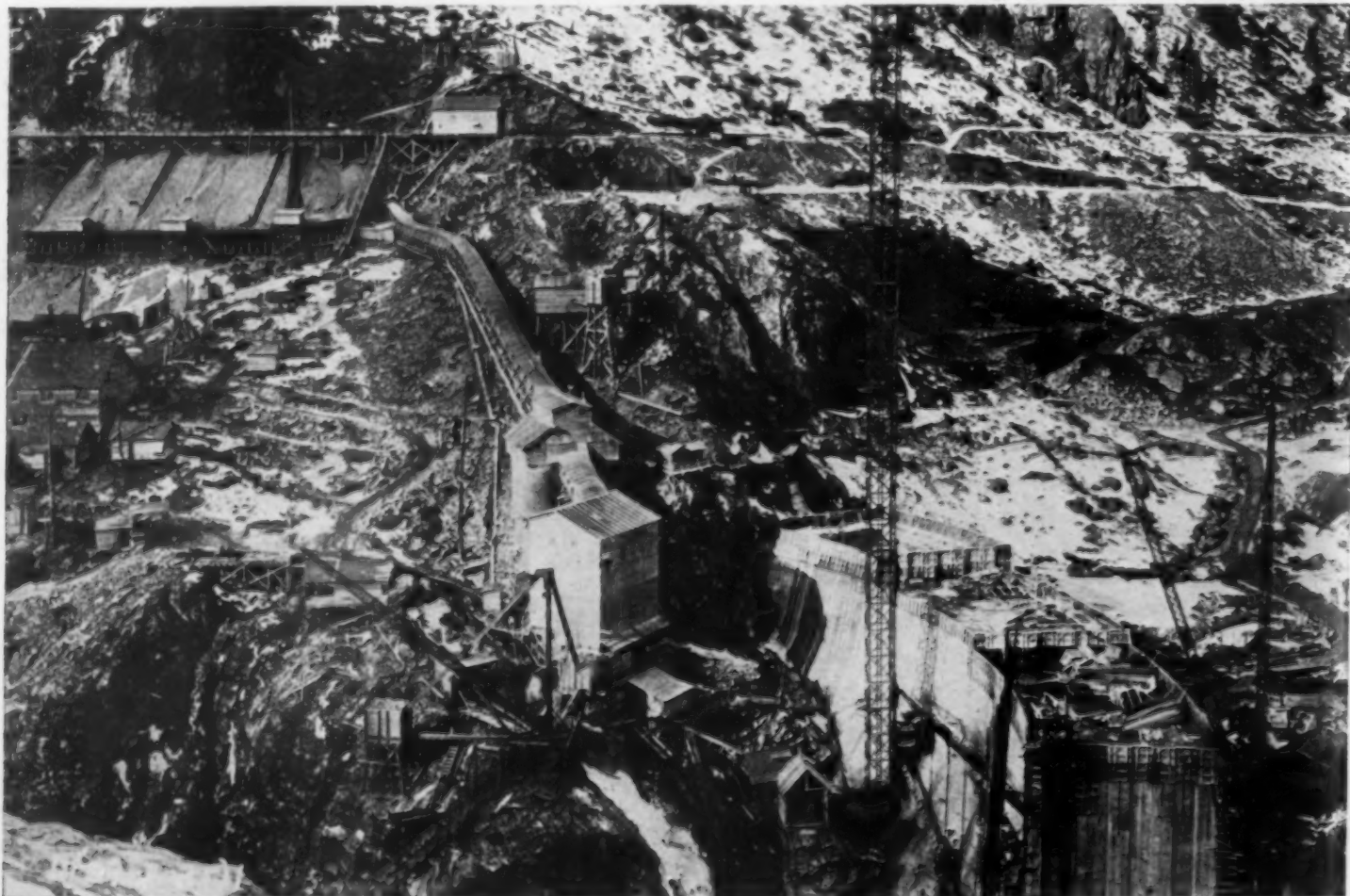
As concreting progresses it becomes necessary to raise the conveyors. This is done by tackle block and a five-part line which elevates the sliding frames on the tower in lifts of 9 ft. each. Each of the two concrete placing plants, with sliding frames, conveyors, hopper, boom and full load of concrete weighs 61,000 lb.

A big advantage claimed for this conveyor system is that the discharge end of the conveyor is readily moved, so that a section of the dam can be rapidly covered with a comparatively thin layer of concrete of uniform thickness. There is no pyramiding of concrete as deposited and very little hand labor is required.

Another conveying belt system is used by the contractor for delivering concrete aggregates, taken from the stream-bed by a Monighan dragline, to a screening plant. It comprises two

100-ft. portable conveyors dumping on to a grizzly from which a pair of fixed 36-in. conveyors, each 250 ft. long carry the material to and away from the screening plant.

W. D. Barkhuff, city engineer of Seattle, is in charge of the work, assisted by T. H. Carver, water supply engineer, and E. D. Alexander, resident engineer. For Winston Bros. Co., W. H. Gardiner is resident manager, F. T. Hillman chief engineer, Matt Galvin, superintendent, and Ralph Kennan, assistant superintendent.



CONTRACTOR'S PLANT LAYOUT, showing sand and gravel bunkers, bulk cement storage silos, covered conveyor to mixer plant and hoist tower carrying boom and conveyor rig.

Present and Accounted For —

A Page of Personalities



BUILDERS OF WORLD'S HIGHEST DAM. Personnel on construction of Owyhee Dam, Oregon, to reach height of 405 ft. at maximum section and total height of 520 ft. above lowest concrete in foundation cutoff. (Left to right): V. G. Hindmarsh, construction engineer, and J. A. McEachern, president, General Construction Co., Seattle; C. A. Betts, office engineer, and F. A. Banks, construction engineer, U. S. Bureau of Reclamation.



DOCTOR OF ENGINEERING. Robert Ridgway, chief engineer of the Transit Commission in charge of New York subway construction, has received an honorary degree from Lehigh University.



GOES TO LONDON. (Below) Major W. G. Sloan has resigned as state highway engineer of New Jersey to become vice-president of the Foundation Co., in charge of European work, with headquarters in London.



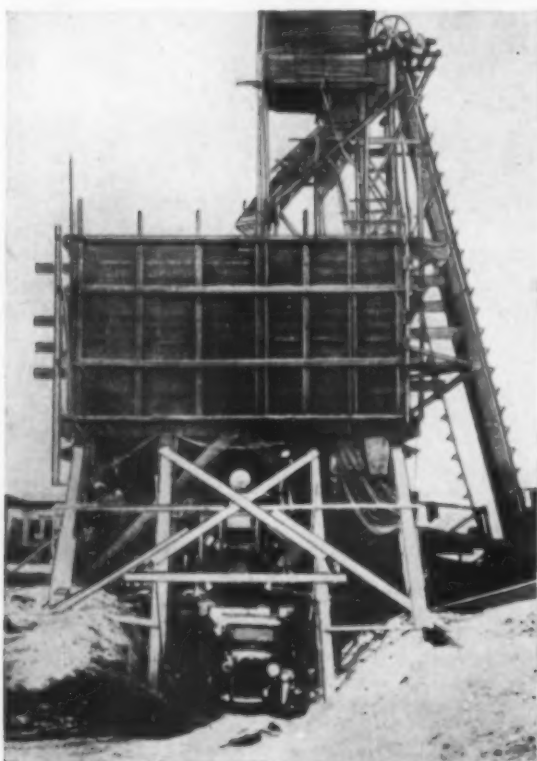
DOCTOR OF SCIENCE. Frank E. Winsor, chief engineer, Metropolitan Water Supply Commission of Massachusetts, has been honored by a degree from Brown University.



MARCH FIELD, when completed, will contain 5 miles of 30-ft. concrete roads.

Central Mixer Speeds Airport Job

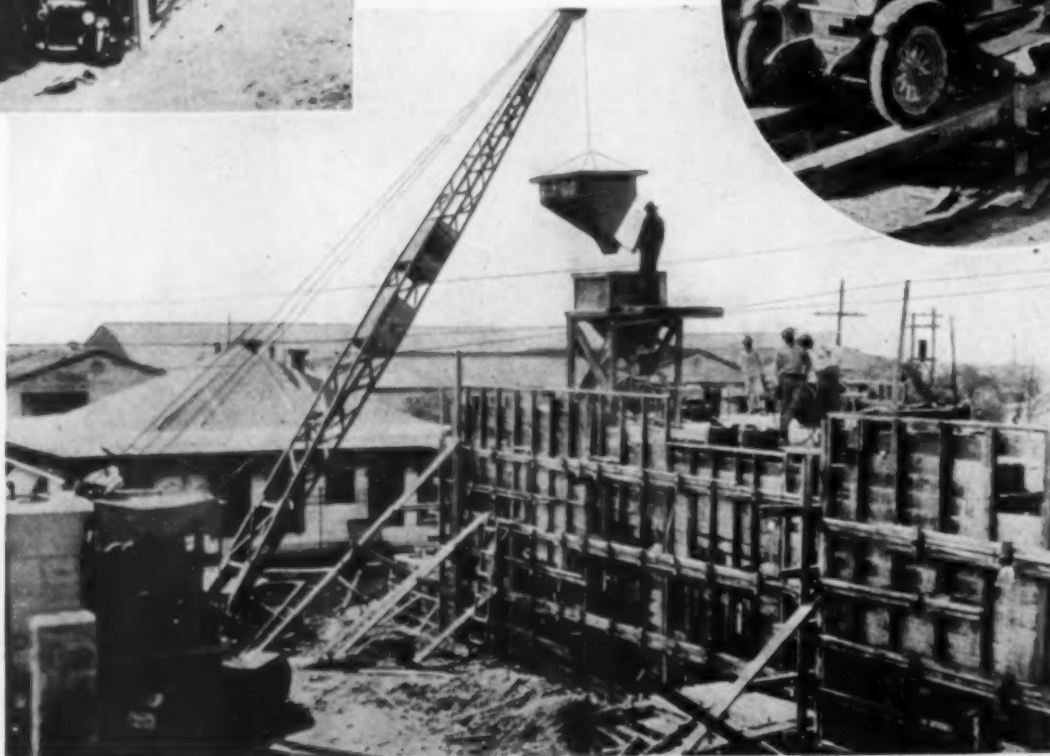
*Small Trucks Deliver Concrete to Hoppers
Within Reach of Crawler Cranes*



CENTRAL MIXING PLANT (left) is fed by conveyors carrying aggregate from railway cars to bins.

UNDER the supervision of Lieut.-Col. William C. Gardenheir, U. S. Quartermaster Corps, March Field near Riverside, Calif., is being completely reconstructed as a

TRUCKS (right) deliver concrete in hoppers to platforms.

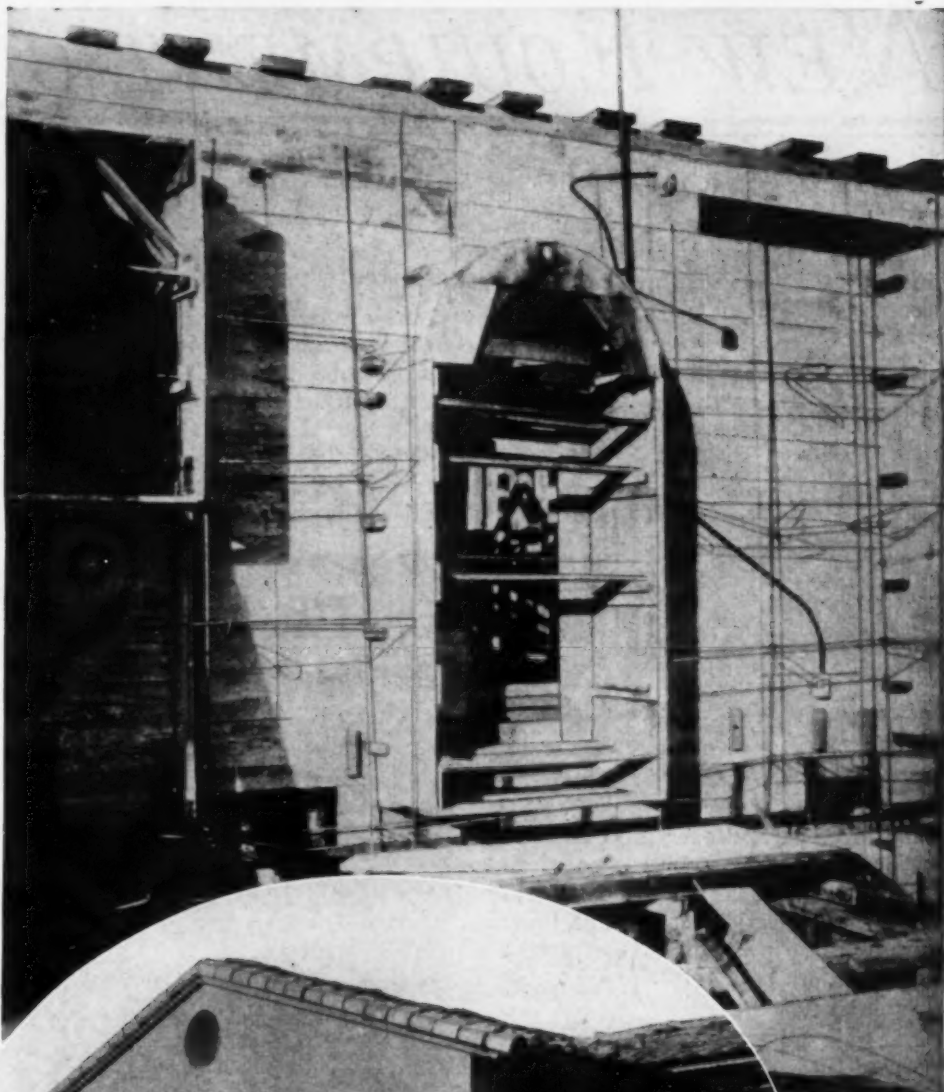


CRAWLER CRANES pick up hoppers of mixed concrete and deliver contents to secondary hopper for distribution by hand buggies.

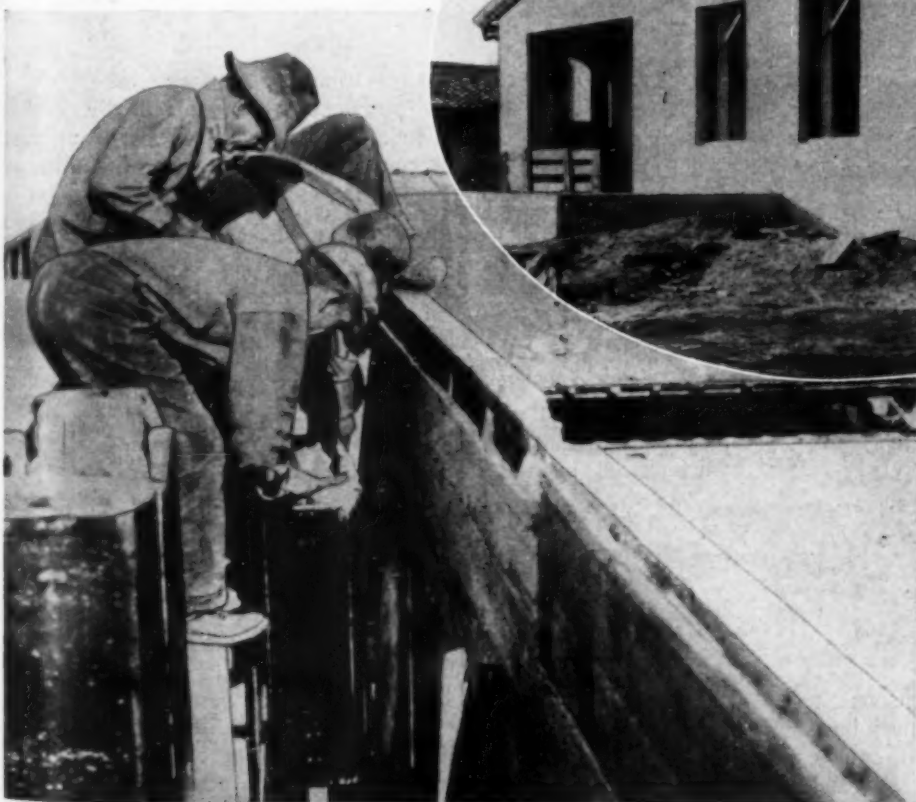
permanent Army Air Service post.

Permanent, fire-safe and architecturally attractive construction is being used throughout, from hangars to administration buildings and bungalows for married officers. In view of the great amount of concrete work involved in this construction a central concrete proportioning and mixing plant has been established on a spur of the railroad which serves the post. From the mixing plant small trucks deliver the plastic concrete to hoppers within reach of traveling cranes. The cranes lift the hoppers into position on the working platform of the individual jobs and from these secondary hoppers the concrete is taken by hand buggies to the forms. At the central mixing plant, bucket elevators carry the aggregates from pits beneath the railroad tracks to bins over the mixer. Hopper bottom cars dump into the pits.

Hollow wall construction is used in practically all of the residential buildings. Hollow cores of either steel or wood are put in place shortly after the inner forms have been erected. Four inches of space is allowed between the inner side of the forms and the outer edge of the cores which are 12 in. thick. This produces a wall 20 in. in thickness, 8 in. of concrete and 12 in. of confined air space. The result is a wall of high insulating qualities, fire-safety, rigidity and attractiveness. The only surface finishing on the outside is a wash of cement paint, while in-



INNER FACE (above) of bungalow forms prior to placing cores for air space in walls of completed structures.



INSERTING METAL CORES to produce insulating air space in concrete walls of structures.

terior decorating plaster is applied directly to the concrete.

In the construction of the hangars, which are 120x200 ft., structural steel is combined with concrete to afford great spans with the largest possible degree of fire safety. Thirty-six of the bungalows and eight hangars already have been constructed. As Congress makes funds available, additional work will be undertaken. It is expected that the entire field, complete with paved runways, will be finished early in 1931.

NEW EQUIPMENT ON THE JOB

"Duo-Rail" Road Form

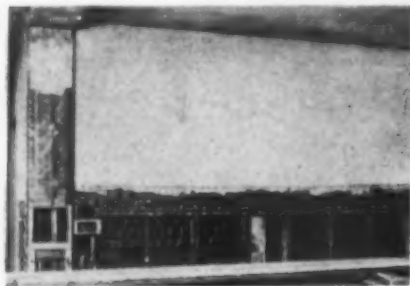
A new "duo-rail" road form has been produced by the Lakewood Engineering Co., Cleveland. The design permits the load of the finishing machine to be carried over the center of the base of the form by means of an auxiliary rail. The base of this form is 8 in. wide and offers almost three times the bearing value of the present standard 6-in. base form.



chine to be carried over the center of the base of the form by means of an auxiliary rail. The base of this form is 8 in. wide and offers almost three times the bearing value of the present standard 6-in. base form.

Ribbed Steeltex for Plaster

Ribbed Steeltex for plaster is the latest development of the National Steel Fabric Co., Pittsburgh. This product incorporates several improvements over the original Steeltex. The addition of horizontal V-shaped steel



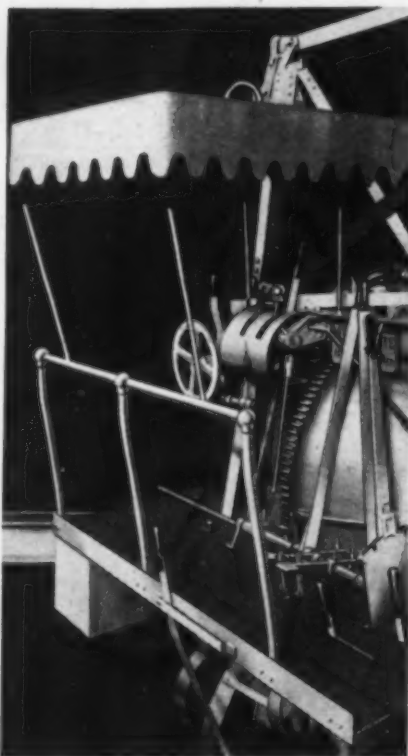
ribs to stiffen the sheet makes it lie perfectly flat, without bulges or hollows. It requires no stretching or toe-nailing. It is cut readily and may be bent to fit corners or curved surfaces. The sheets, with heavier backing than formerly, are 50x28½ in. and are packed in strong fiber-board cartons containing 50 sq. yd.

Under a plasterer's trowel the new Steeltex presents a surface of board-like rigidity due to the heavy backing and stiffening ribs, and plaster is

applied with economy of effort and without waste.

"Power Operator" for Paver

A new system of control known as the "power operator" is one of the features of the 1929 Multi-Foote paver manufactured by the Foote Co., Nunda, N. Y. The power operator consists of two levers mounted at the left center of the platform on a shaft which oscillates. When either lever is



moved it engages a cam on the shaft which in turn actuates the clutch, thus materially speeding up operation of the controls.

Steel Nailer Joist

A new steel nailer joist the cost of which compares favorably with that of wood is being manufactured by the



Truscon Steel Co., Youngstown, Ohio. This joist, for floor and roof construction, consists of an open web truss of steel with a wood screed or strip embedded in the top member and projecting 1½ in. above the steel. Floor planks are nailed directly to the screeds.

One-Man Chain Puller-Jack

The Anchor chain puller-jack which can be carried, handled and operated by one man on jobs such as moving railroad cars, pulling out mired trucks,



tightening cables, etc., is a new machine developed by the T. H. Edelblute Co., Pittsburgh. On a straight line pull (with the aid of a drawbar) one man pulled 4,800 lb., two men, 6,500 lb. With a sheave block, one man pulled 6,700 lb. and two men, 9,800 lb.

Reduces Mixing Cycle

Automatic operations on the new 27-E paver, manufactured by the Koehring Co., Milwaukee, have brought the complete mixing cycle, including charging and discharging, down to 69



sec. with a one-minute period allowed for mixing. The duties of the operator consist only of lowering the skip and operating the bucket control lever. The height of the paver is 11 ft. 3 in. and its weight 22 tons.

Every bearing in the power transmission line is a ball or roller bearing. An oscillating boom permits the bucket to bang perpendicularly regardless of tilt of paver, thus preventing binding of bucket rollers.

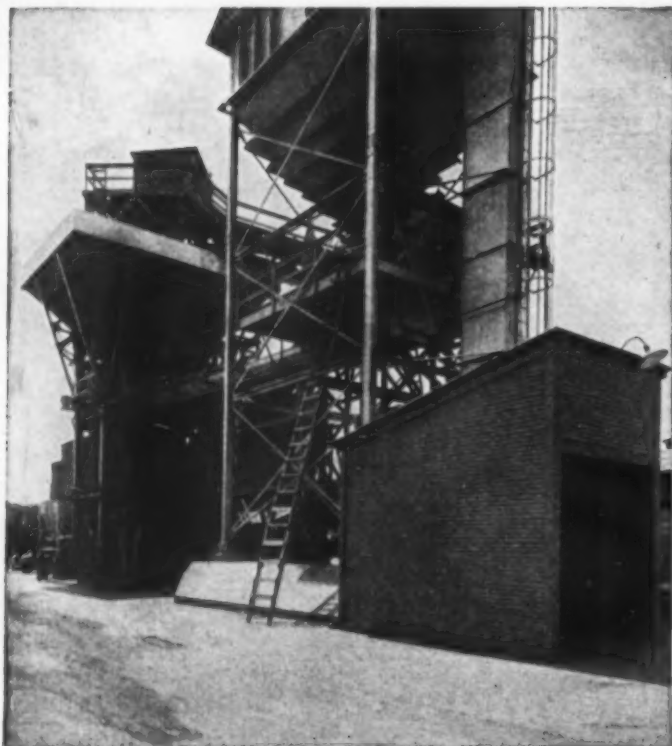
FOR a 1¼ yd. shovel, look for the name LORAIN-75. This is the shovel with the Center Drive—a fast moving powerful shovel, quick on the levers, with nothing but rugged strength from crawler to dipper stick.

It's THERE, every inch of the way. We know it. The owners know it, you'll know it too. All you need to do is let it show its stuff—on rock, against time, or over a period of years.

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Shovels • Cranes • Draglines • Backdiggers • Locomotive Cranes
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2 TELEGRAMS concerning a Ransome 84-S MIXER~



The Ransome 84-S in the Central Mixing Plant of the Super Concrete Corp., Washington, D. C., mentioned in the second telegram:

A concern in New Jersey wired the Super Concrete Corp., Washington, D. C.:

"We contemplate the purchase of a three yard Ransome Mixer STOP Would appreciate your telling us any mechanical or practical troubles STOP Kindly wire us night letter collect today."

Here's the answer they received:

"We operated a two yard Ransome Mixer in Richmond, Va., for 14 months without a single breakdown STOP Have been operating a three yard Ransome Mixer here for 60 days without any trouble whatever STOP We do not think you will make a mistake by buying a Ransome Mixer."

Have you read our survey, "Central Mixing Plants"? If not, send us \$1.50 for a copy before the limited edition is exhausted.

Ransome Concrete Machinery Company

1850 — Service for 79 Years — 1929

Dunellen

New Jersey

15,240 GALLONS per HOUR at 5 FOOT HEAD



DRAINS

Manholes, Basements, Sewers, Quarries, Sumps, Tanks, Ditches, Trenches, Troughs, Excavations, Cisterns, Pest Cesspools, etc.

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Boilers, Tank Cars, Pavers, Oil Burner Tanks Requiring Underground Testing, Outdoor Swimming Pools, etc.

FLOODS

Skating Rinks, Irrigation Ditches and Large Areas on which growing produce is in need of moist ground, etc.

CAPACITIES

Head in Feet	Gallons Per Hour	R.P.M.
5	15240	2150
10	14100	2200
15	12960	2250
20	11820	2300
25	10620	2350
30	9480	2400
35	8280	2450
40	7140	2500
45	6000	2600
50	4800	2650
55	3360	2700

\$180.00
F.O.B. FACTORY

A NEW model Centrifugal Portable Pump, by Evinrude—the pioneer portable pump builder since 1915!

A new model into which is built 14 years of manufacturing and engineering experience—years of “knowing how.”

A new model which is millions of gallons beyond experiment, because scores of them have already been out in the field for months.

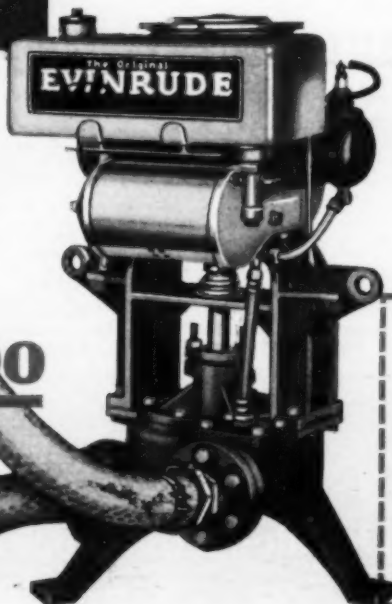
A new model of 140% greater capacity than its popular predecessor, yet 10 lbs. lighter and 11% more compact.

A new model of 6 horsepower instead of 2 horsepower, and two-cylinder instead of one.

A new model, eight times more efficient than the ordinary diaphragm pump. And in the portable power pump field, priced at just about one-half its real competitive value on the basis of gallons per hour.

Mail the Coupon for Catalog and FREE Demonstration.

EVINRUDE DIVISION, Outboard Motors Corp.
MILWAUKEE, WISCONSIN



CENTRIFUGAL
EVINRUDE
PORTABLE PUMP

EVINRUDE DIVISION,
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Gentlemen: Send complete catalog on Centrifugal Portable Pump and name of nearby distributor who can demonstrate.

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City.....

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A5393-C



Driving 44" and 52" Pile Cylinders

was the job handed McKiernan-Terry Hammers by Spencer, White & Prentiss for the foundations of the Bank of Manhattan Bldg. ("40 Wall Street")—about 80' higher than the Woolworth Building. Three 44" cylinders ($\frac{1}{2}$ " wall) were driven to 32' penetration with McKiernan-Terry No. 6 Hammers *in tandem*. A single 9B2 drove three 52" ($\frac{5}{8}$ " wall) cylinders 32' penetration. All driving through sand and hard pan to rock. Hundreds of other smaller pipe piles were also McKiernan-Terry driven on this notable job—naturally! Have you the McKiernan-Terry Catalog?



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BORCHERT-INGERSOLL, INC.
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SUPPLY CO.
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No. 6A—A.G.C. for dry material. Capacity $3\frac{1}{2}$ cu.ft. All Sterling barrows have reinforced tray tops and corners. This is the most popular general type barrow.



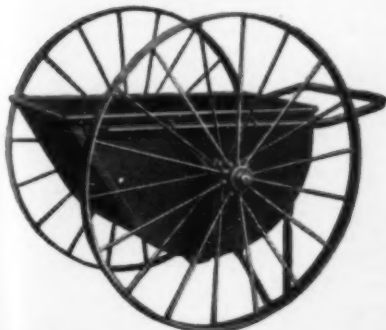
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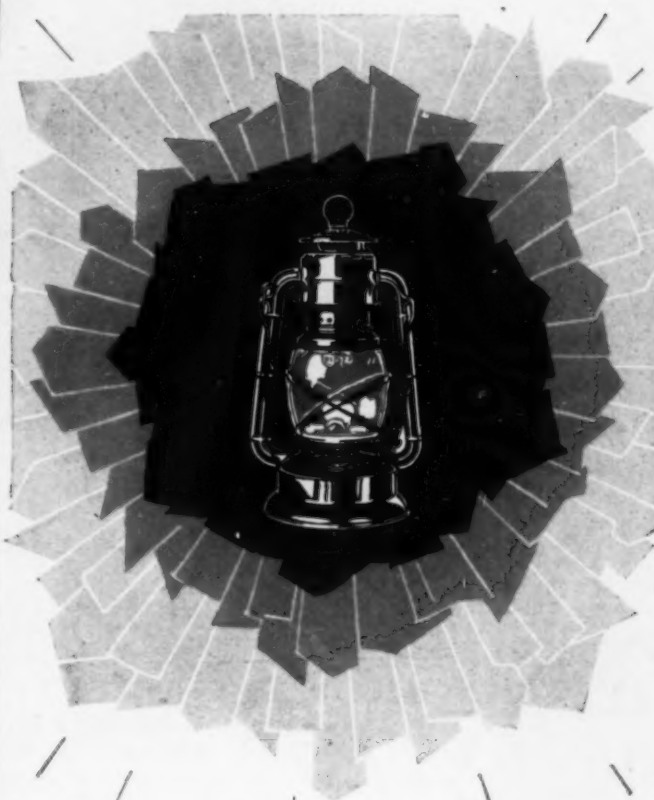


No. 6—the strongest built cart on the market. Full capacity body, no axle inside. Capacity 6 cu.ft. or 1200 lbs. Perfect balance and easiest wheeling. 42-in. wheels.

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Wherever material handling volume plays a major role, a Browning's productive work pays dividends which in turn pay for the Browning.

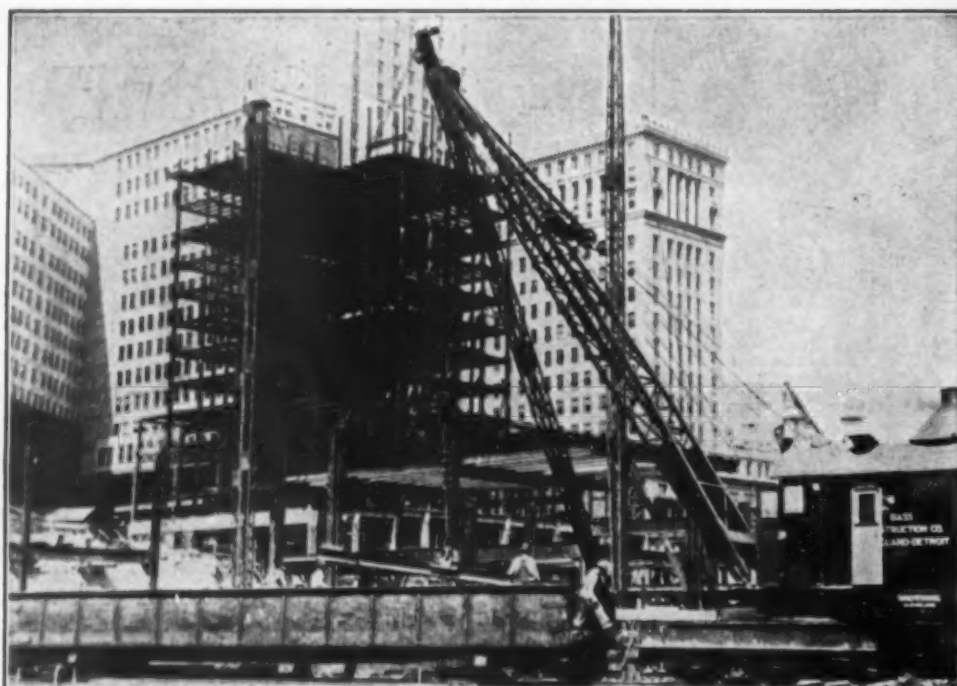
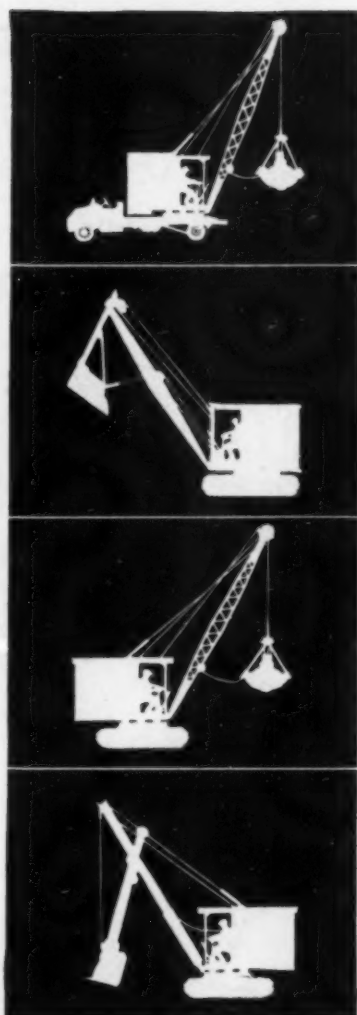
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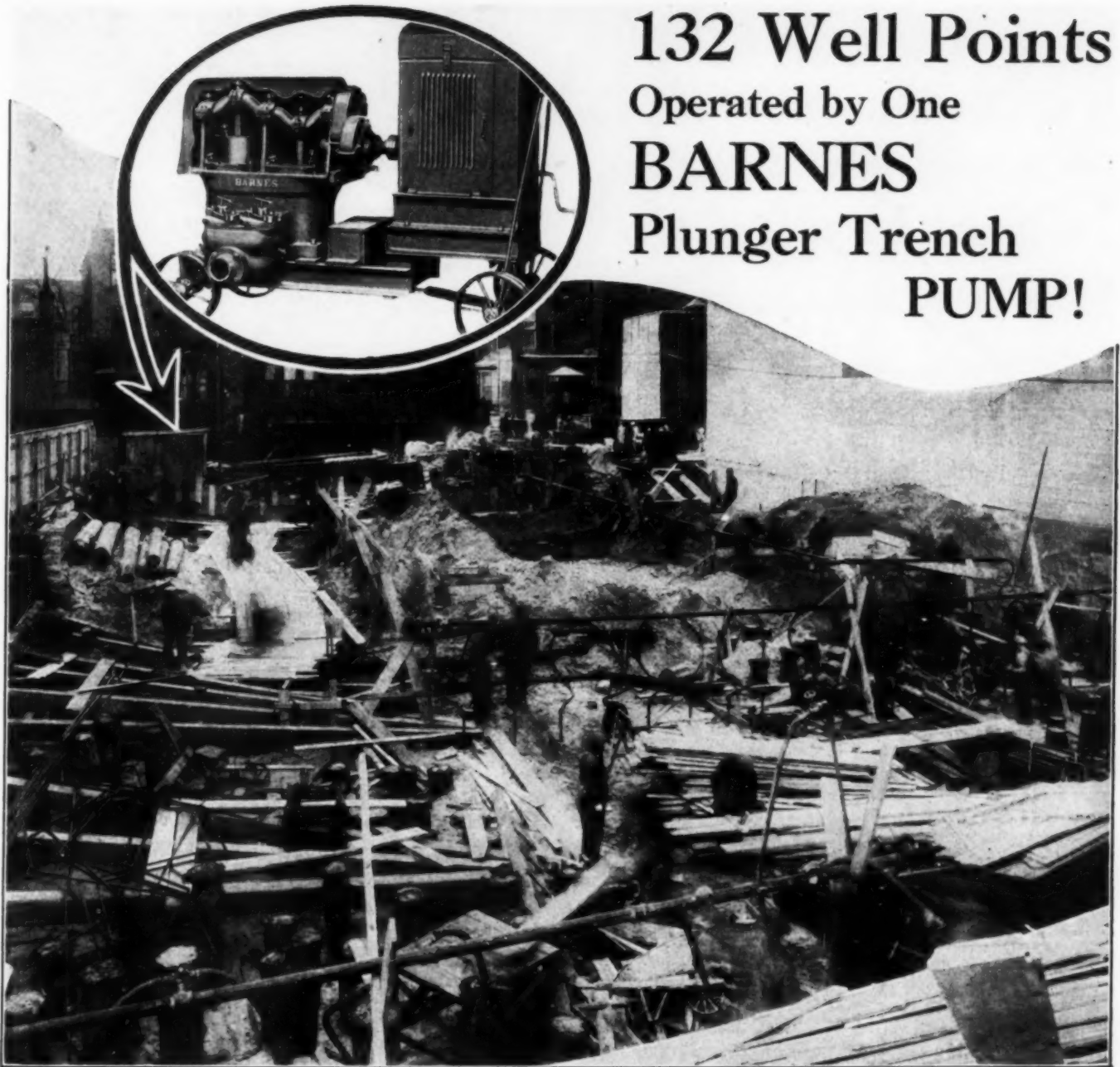
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PROOF of the dependability of the Barnes Plunger Trench Pump is shown by the performance of a model L-308-A Plunger Trench Pump operated by the Nelson Building Construction Company, Chicago.

Pumping steadily day and night for 24 days, and at times handling 132 points, this sturdy Barnes kept the excavation illustrated above dry at all times. There was plenty of water to handle as the job, located on Lake Shore Drive, Chicago, is right on the shore of Lake Michigan. The area of the job was over 10,000 square feet, the footings 12 feet below grade, and the points about 9 feet below lake level.

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The Barnes Manufacturing Company,
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Please send me complete information about Barnes Plunger Trench
Pumps for dewatering excavations in sand.

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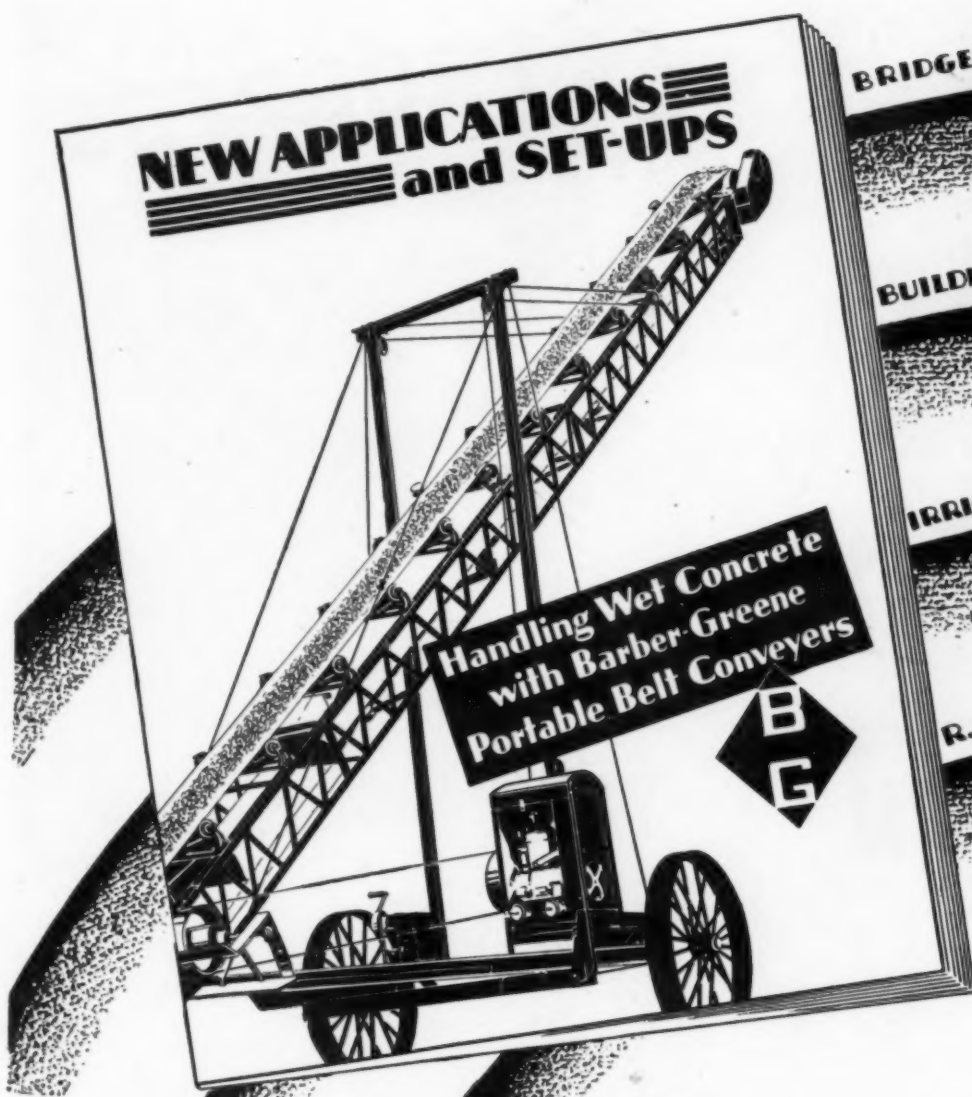
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The large number of jobs detailed in this interesting book—"New Applications and Set-Ups"—may suggest new ideas to cut your costs, through the elimination of hoists, towers, chutes, lifts, wheelers and other wet concrete handling equipment. Send for your copy today.

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Please send me a copy of the new wet concrete book—
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"Here, Lad—

My past experience as a building contractor tells me that we're in for a big cost before starting on the addition to that old office building.

You see, tearing out the old walls to frame the beams into the columns is something which will cost us lots of money and may bring us out shy on the contract."

**The Lincoln
"Stable-Arc" Welder**

- welds easier
- makes better welds
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because of the steady uniform arc throughout entire welding range, which is the result of:

- Variable voltage design
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No other welder has all these features

"Yes, Pop—

and I feel a bit shy in reminding you that we're not doing this contract on your *past experience*—but rather your present experience.

It won't be necessary to tear down the old walls.

The framing connections can be made by removing the brick veneer and framing the new floor beams into the columns by means of arc welding.

Then it will be possible to stiffen the old columns, where necessary, by this same 'Stable-Arc' process.

So you see, Pop, the only way we'll come out shy will simply be by shying clear of extra work.

Thus you can be shy in more ways than one—like a woman telling her age."

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LINCOLN WELDER**

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BIGGER implements—bigger loads — bigger schedules! All along the line the call today is for greater speed and greater output. More yards moved per hour, more miles covered per day; more work accomplished per dollar spent!

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THE TOLEDO HORSE



Just drop a piece of any 2" standard sized lumber between the jaws of two of these rigid pressed steel frames and lock the feet in an open position. Result, a complete and perfect horse, ready for use. Average elapsed time, 30 seconds.

Setting up a Toledo Horse is as simple as walking up-stairs. Locks in permanent position without springs or notches. No adjustable parts, yet ordinary thickness variations are readily accommodated.

Extreme rigidity, lasting durability and convenience of handling, make Toledo Horses ideal for highway barricades. Always ready for all general purposes, yet conveniently out of the way until wanted. Loading capacity twelve ton per pair. Available in different heights.

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The Toledo Horse is indispensable to the contractor, garage, warehouse, shop or factory. Its great utility is made available to all through its low price.

Full particulars gladly furnished.



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THE TOLEDO PRESSED STEEL CO TOLEDO, OHIO

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THIS is one of the many advantages of using Cleveland Bolt Sleeves. Others are—elimination of labor ordinarily used to cut bolts—smoother construction, and only one man is required to remove bolts.



Bolt Sleeves

Test Containers

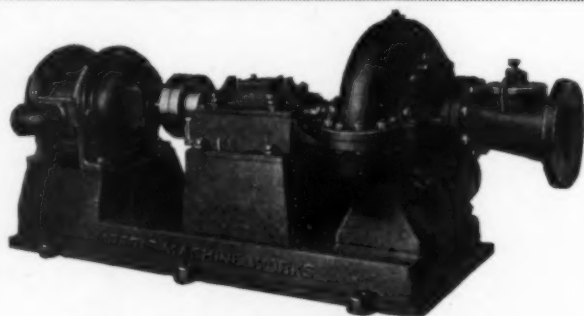


TEST CONTAINER

Cleveland Test Containers, paraffin dipped, are ideal for taking samples of concrete, cement, asphalt, etc. Sizes—5 inches x 12 inches and 8 inches x 16 inches. Shipped in cartons of sixteen.

Cleveland Paper Tube Products include dowel sleeves, form and bolt sleeves, test containers, blueprint tubes, capped and uncapped tubes for casting railing, conduit and culvert holes, etc. Sizes 1/4 inch to 10 1/4 inches diameter. Samples at your suggestion. Write for one.

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10135 Berea Road, Cleveland, Ohio
Manufacturers of Paper Tube Products for the Construction Industry



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for handling raw sewage, pulp, trash, liquids holding semi-solids, etc.

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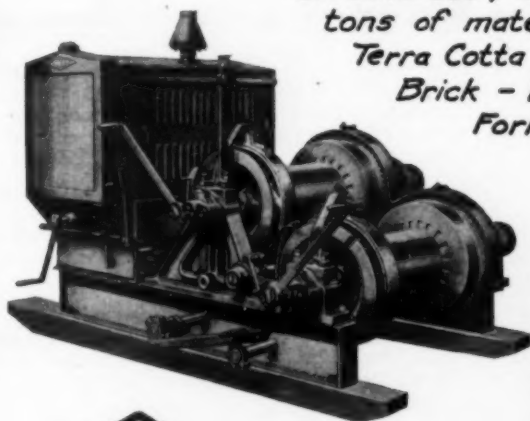
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Below is shown a sketch of the one and a quarter million dollar city hall at Atlanta, Ga. now being built by the National Const. Company of Atlanta. On this job, a Clyde double drum gas hoist handled a 14 foot concrete bucket in tower hoisting 3000 yds.

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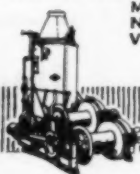
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Non leaking from 1 oz. to 1000 lbs. pressure
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Cannot accidentally come apart—but can be connected or disconnected quick as a wink by operator.
Used for air, water or steam connections.

Sizes 1/4-in. to 4-in.
Made of Tobin Bronze.
Prevents hose kinks and strains.
Works perfectly in mud, snow or ice.
Lasts four times as long as ordinary couplings.
Stands hard, tough abuse.

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Thor PAVING BREAKERS *Powerful Vibrationless*



The "recoil" or "kick-back" has been eliminated in the Thor and the full effect of the blow is directed downward on the work. Your men will appreciate the relief from fatiguing vibration and will be able to do more work.

The new steel retainer on the Thor absolutely prevents the steel from dropping out of the nozzle. This retainer, being a flexible chain will not break or loosen if it were to strike the concrete when the steel goes to its full depth.

Here is a breaker that your men will like to use. Put one on a test job. Work it hour after hour, day after day. You'll find that it is built to stand terrific punishment and to make profits for you.

Made in two sizes—one for light, fast work and the other for heavy duty jobs.



Thor Portable Air Compressors are the only compressors with the Rix Super-Charger, which enables them to deliver more air than any other compressor of the same capacity. Investigate before you buy. Write for full information.

INDEPENDENT PNEUMATIC TOOL CO.
PNEUMATIC TOOLS 246 So. Jefferson St. CHICAGO ELECTRIC TOOLS

STRUCTURAL STEEL CREATED THE SKYSCRAPER



STEEL—always ready for action—STEEL



STRUCTURAL steel comes to a building site ready to go into place . . . ready for immediate action . . . ready to speed the building process with perfect adaptability and efficient fitness. Freezing . . . intense heat . . . rain cannot impair the strength of steel or hinder its erection. Here is the one building material that *always* can be depended upon to do its duty any time, anywhere.

Because of the perfect adaptability of steel, a

steel building goes up more quickly. Floors may be laid, curtain walls built, finishing operations conducted on several stories at once. A steel building is ready for occupancy sooner—starts paying dividends more quickly—than any other kind of structure.

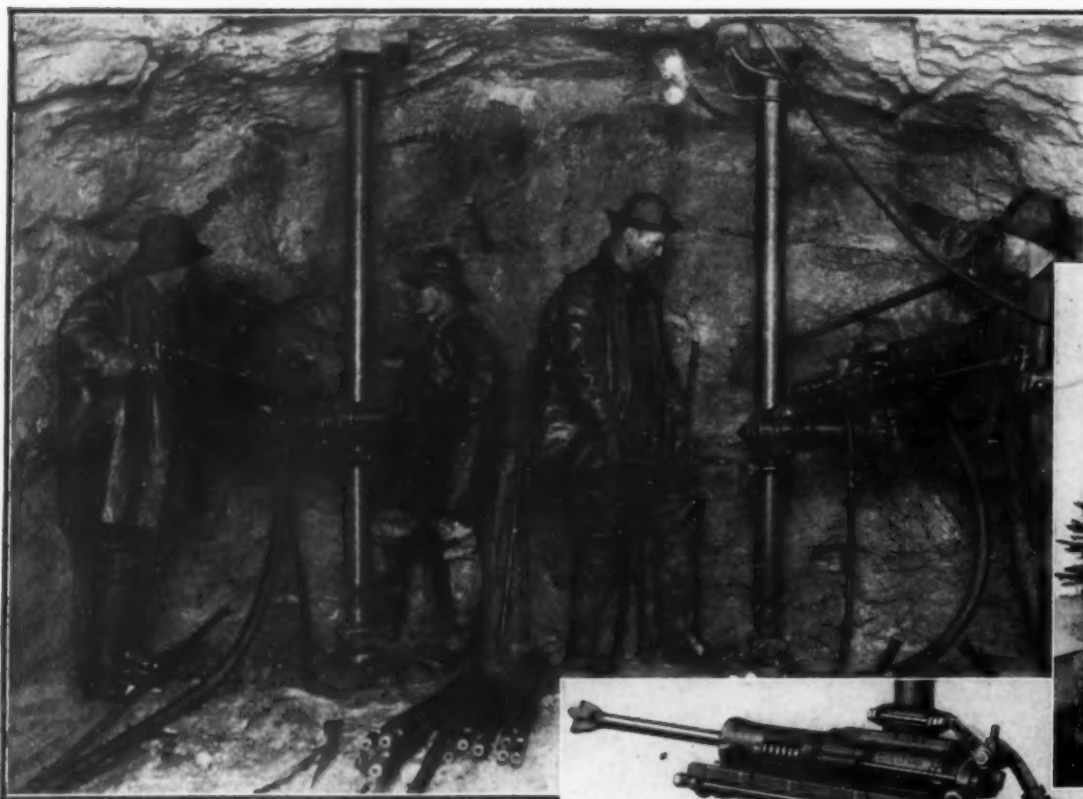
A Technical Service Bureau is at the disposal of architects, engineers, owners and others who have need of any information which can be supplied through the American Institute of Steel Construction, Inc.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION, INC.

The co-operative non-profit service organization of the structural steel industry of the United States and Canada. Correspondence is invited. 200 Madison Avenue, New York City. District offices in New York, Worcester, Philadelphia, Birmingham, Cleveland, Chicago, Milwaukee, St. Louis, Topeka, Dallas and San Francisco. The Institute publishes twelve booklets,

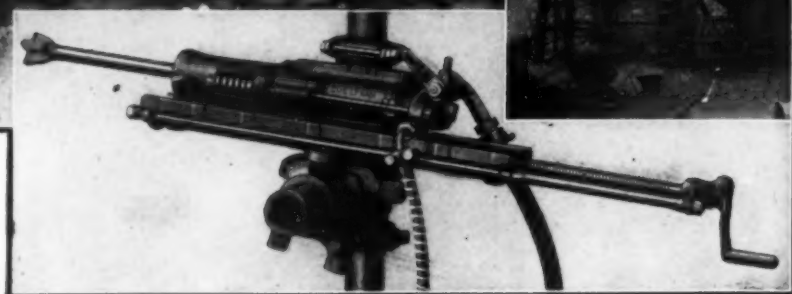
STEEL
INSURES STRENGTH
AND SECURITY

one on practically every type of steel structure, and provides also in one volume, "The Standard Specification for Structural Steel for Buildings," "The Standard Specification for Fire-proofing Structural Steel Buildings," and "The Code of Standard Practice." Any or all of these may be had without charge, simply by addressing the Institute at any of its offices.



Left: — "T-3" Water Drifters in heading at shaft 8 (Intake Shaft) at Ware River.

Below: — Mining Type Headframe at Shaft 5, 652 ft. deep.



SULLIVAN ROCK DRILLS

are tunneling for water in Massachusetts

In the Massachusetts hills, near Worcester, Sullivan Rock Drills are boring a 12 ft. 9 inch tunnel, 13 miles long, through solid granite, to bring additional water supply to the Boston area. Eight shafts were sunk along the line of this tunnel, from 200 to 650 feet in depth. Sullivan Rotator Rock Drills were used for the shaft work. Thus far over 7 miles of tunnel have been driven from the different headings. The work is going forward night and day, since Boston needs more water urgently.

Sullivan "T-3" water drifters on mining columns, are used for tunneling work in 10 out of 14 headings. These same drills are employed on crossbars, for drilling the bench for enlargement to full tunnel size.

At seven different points, Sullivan Heavy Duty Drill Sharpeners and

oil-operated Drill Steel Furnaces supply correctly tempered and sharpened steel for all the drills.

Sullivan Air Compressors Supply Air Power

All compressed air power for the shafts and tunnels is furnished by 18 Sullivan Angle Compound Air Compressors, arranged in groups of 3 or 4 as shown in the illustration. This Multi Unit arrangement gives excellent flexibility for varying capacity demand. These units range from 500 to 750 cubic feet in capacity and are operated by short belt drive from G. E. and Westinghouse motors.

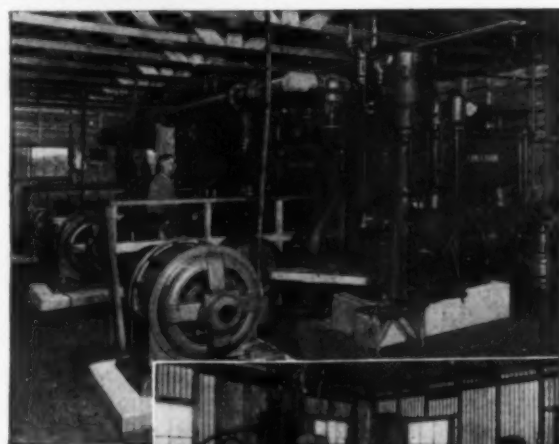
The general contract for the enterprise, under the Metropolitan District Water Commission, is held by the West Construction Company, with headquarters offices on the job at West Rutland, Massachusetts.

SULLIVAN MACHINERY COMPANY

816 Wrigley Bldg., Chicago

Boston, 45 Milk St. New York, 30 Church St.
Mexico London Paris Sydney Tokyo Santiago

Offices and Distributors in all Principal Cities



Above: — The 3 Sullivan Angle Compound Compressors at Shaft 2; similar groups of "Angles" furnish air at all other shafts.

Below: — A Sullivan Drill Sharpener and Oil Furnace like this are in use at each of the 7 shafts.



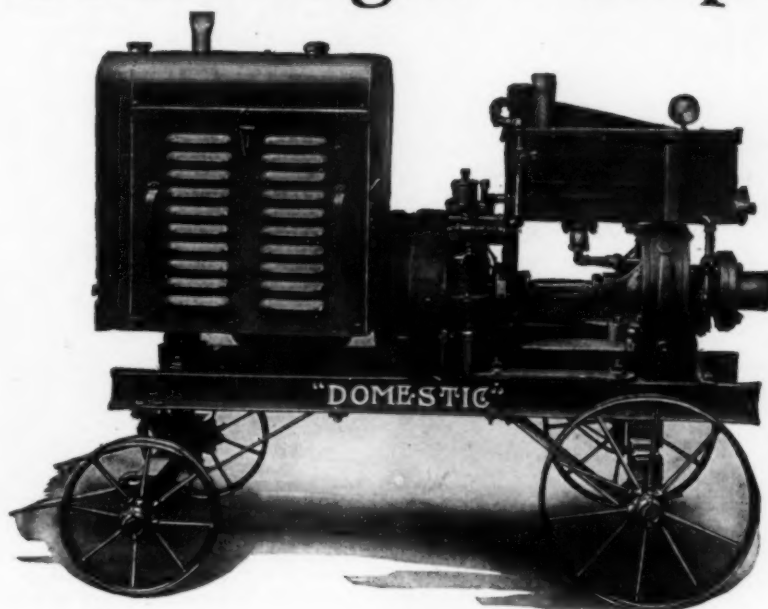
Sullivan Rock Drills are available for any class of rock excavation, and Sullivan Air Compressors are built for any desired drive or capacity range.

The catalogs will be sent upon request.

S U L L I V A N

TRADE MARK

"Domestic" Automatic Priming Centrifugal Pumps



These Pumps will Pick up their own Prime on Suction Lifts up to 27-Feet Vertical

This is the outstanding development of the century in Contractors Drainage Pumps. It has three major advantages of great importance.

First: it has increased the practical SUCTION LIFT of a Centrifugal Pump from 18 to 27 feet.

Second: it gives the contractor a large capacity, valveless Pump that will pick up its own initial prime and automatically maintain it whenever the suction line is sealed with water.

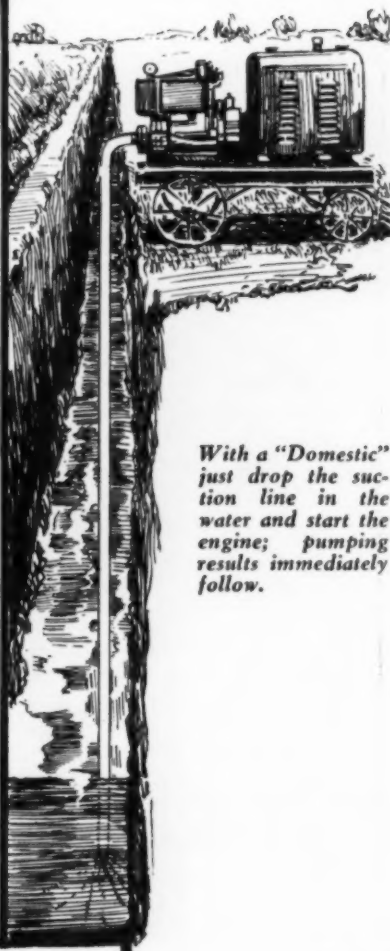
Third: it will remove a large volume of water quickly and then KEEP THE EXCAVATION DRY.

Made in sizes to meet the needs of most Contractors de-watering requirements.

Manufactured by the
**DOMESTIC ENGINE & PUMP
COMPANY**
Shippensburg, Penna.



With a "Domestic" you can pump the trench dry AND KEEP IT DRY.



With a "Domestic" just drop the suction line in the water and start the engine; pumping results immediately follow.

SLATE

AUTOMATIC TRACTOR SCRAPER

Invented and patented in 1919—and developed and perfected by 10 years actual construction work.

Does its own digging—no rooting—no scarifying.

Takes rocks, boulders and stumps. In brief, more yardage per h.p.

STRONG. Stands up to hard work, regardless of size tractor used. Lever and hydraulically operated. All steel, riveted and welded. Operated by tractor-driver.

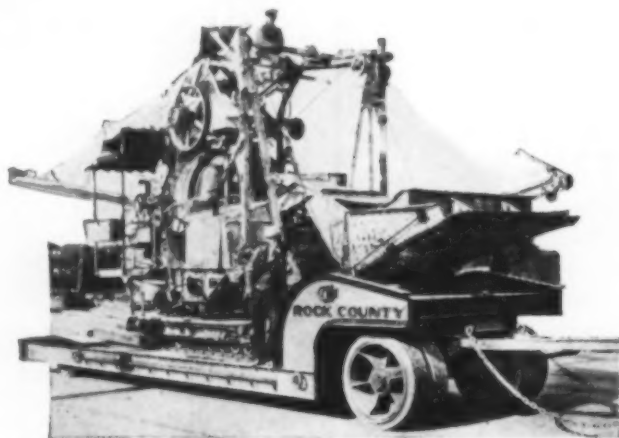
RELIABLE DEALERS WANTED



Write NOW for Bulletin giving full details of this remarkable, **STRONG** automatic dump scraper. A Western product—but will soon be used all over the country. Get full information today and cut down your "scrapping" costs.

SLATE CONSTRUCTION CO., Albany, Oregon

WHAT Do You Have to Move? WHAT Is Your Line of Business?



IF YOU are a contractor and will furnish the above information we will advise just which Roger Trailer is adapted for handling your work with satisfaction and a definite saving.

If you are a moving contractor we'll show you how to establish in a most satisfactory business free from cut-throat competition and capable of paying a very nice profit.

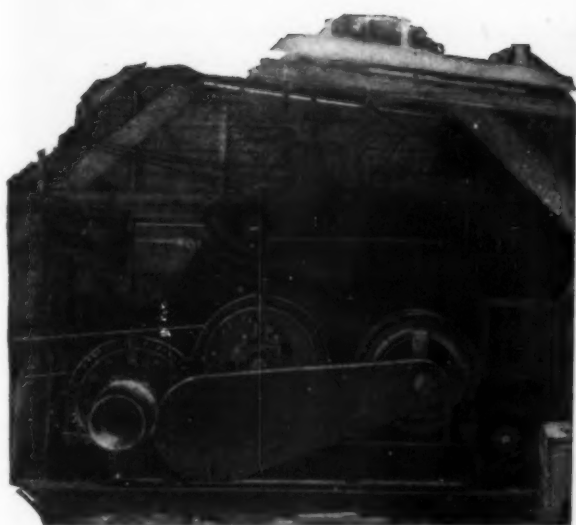
Write for catalog 28.

ROGERS TRAILER

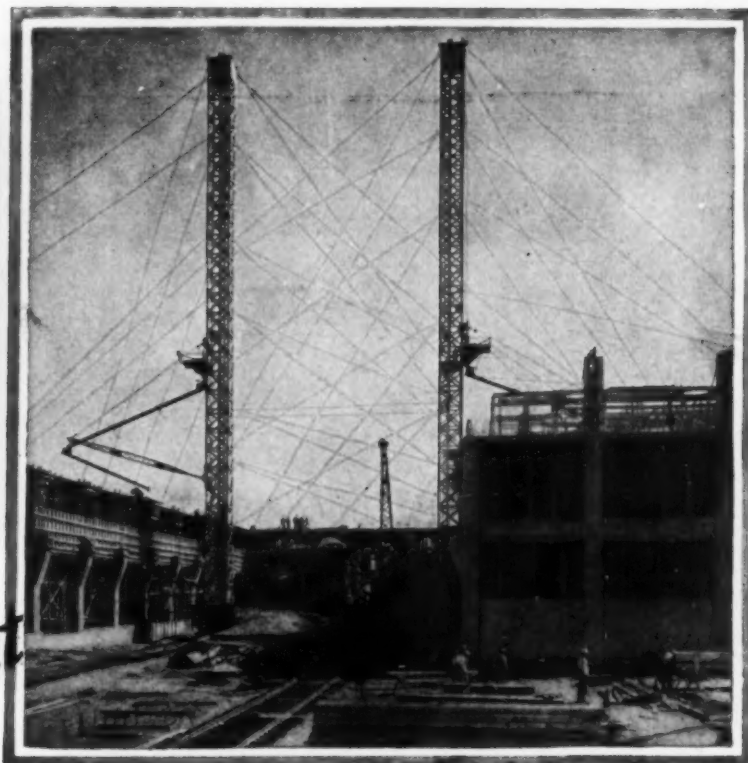
There is a Rogers
Trailer for Every
Heavy Duty Service



Rogers Brothers
Corporation
106 Orchard St.
Albion, Penna.



*Contractors Prefer
Electric Equipment*



In the operation of CONCRETE TOWERS

These reasons were given by representative contractors, queried in a nation-wide survey:

- Economy
- Few repairs
- Low upkeep
- High salvage value
- Dependability
- Best for cold-weather work
- Breakdowns minimized
- No smoke or soot
- No handling of fuel or ashes
- Reduced fire hazard
- Convenience
- Ease of handling and operating
- Compactness
- Flexibility
- Noiseless
- No water lines.

A Clyde hoist operates these two concrete towers being used by Thomas S. Byrne, Inc. on the new Montgomery-Ward building at Fort Worth, Texas. The hoist is equipped with G-E motor and control.

Thomas S. Byrne, Inc. is one of the many nationally known contractors who not only employ electricity on their projects, but utilize it most effectively through G-E Motorized Power.

—and other contractors say:

"Our company owns and operates about 20 electric motors on construction work. The total horsepower of these motors is 216-hp. We find electric power is more convenient in every way. It is necessary on most work to have electric power for lights, drills, hammers, etc.; therefore, it is of small cost to operate other electric equipment".—Wm. Simpson Construction Co., Los Angeles, Calif.



Motorized Power
—fitted to every need

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN PRINCIPAL CITIES

200-239

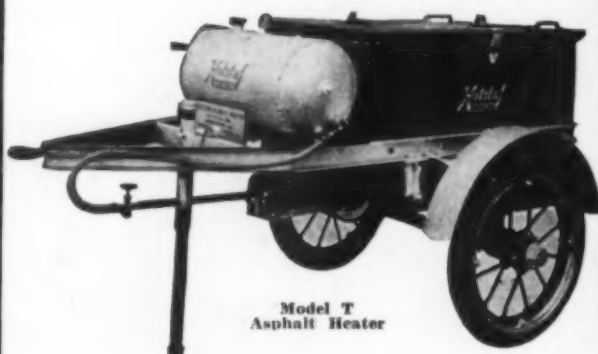
Hotstuf

TRADE MARK
REG.

ASPHALT HEATER

*with Patented Elevated
Melting Chamber*

produces 30 per cent to 50 per cent
**GREATER MELTING EFFICIENCY
and ECONOMY**

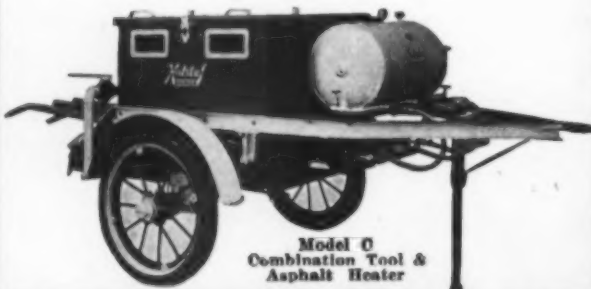


Model T
Asphalt Heater

The Hotstuf Asphalt Heater is especially adapted for road contractors, state highway and city street departments. This heater has approximately double the melting capacity of the old style wood burning kettle, and eliminates the smoke nuisance and fire hazard.

The No. 50 Heater mounted on wheels is especially suitable for patrol work, patching, filling cracks, and resurfacing, and is very economical and convenient to operate.

The Model-C Combination Paving Tool and Asphalt Heater will produce Hot Tools and Hot Asphalt in 5 minutes. Saving approximately \$10 per day over old style fire wagon.



Model C
Combination Tool &
Asphalt Heater

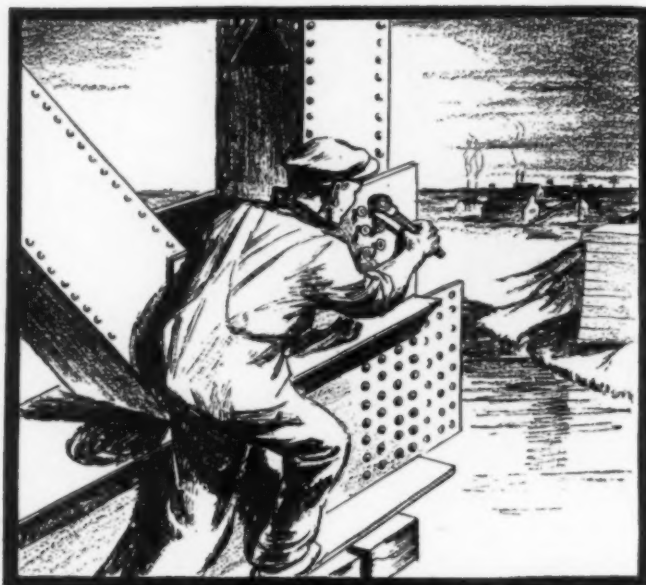
MOHAWK ASPHALT HEATER CO., Schenectady, N. Y.

Please tell me more about the Hotstuf Asphalt Heater.

Name

Address

I am a Contractor ☐ I am a Distributor ☐

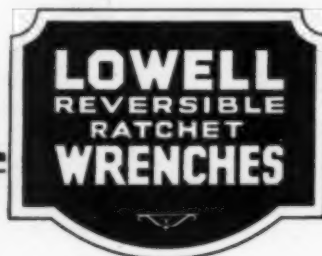


For Bridge Work

For those one-hand wrench jobs, Lowell Steel Socket Bridge Wrenches do the work easily and quickly.

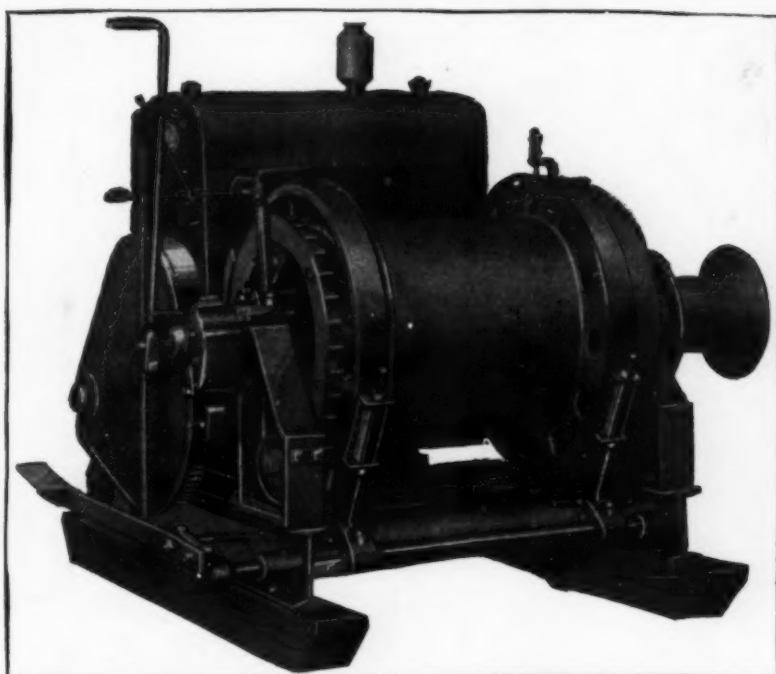
With a Lowell you can turn nuts on or off without removing the wrench—and turn the trick with one hand. And what a difference there is between the speedy pumping of a Lowell and the more laborious way of refitting after every turn. The first fitting is the last. No time lost getting the wrench back on the nut. May we send you complete catalog R? Big special wrenches for special needs.

**LOWELL
WRENCH CO.**
Worcester, Mass.

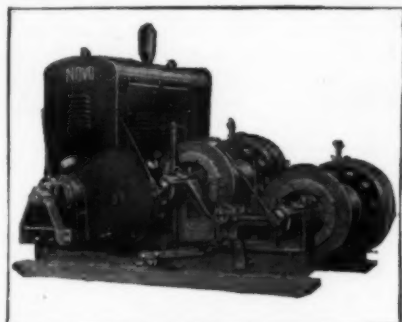


NEW

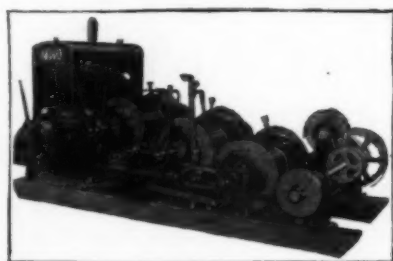
**Greater Speed
Greater Loads
Greater Profits**



Speeds Up Construction Jobs



New Novo WH Two Drum Hoist



New Novo WH Three Drum Hoist
with boom swinger

Complete your construction jobs quicker. Save a bigger chunk of the contract price for yourself. Lift bigger loads, faster and higher—with the new Novo WH Hoists.

Speed—Larger diameter drum provides greater hoisting speed—wider drums give greater cable capacity.

Easy Control—Friction blocks of a special asbestos composition bring the loads to a quick, sure stop—wider ventilated brakes eliminate heating—and establish a “finger-tip” control.

Strength—The electric welded base—the nickel alloy side frames and gears—the extra wide drum gears—make a far stronger, more rigid construction. Shrouded ratchets can’t break and hold the pawl positively in engagement.

Power—And Novo double fly-wheel engines provide plenty of surplus power to handle the heavy loads at high speed with close to “steam control.”

Send the coupon for the new folder “Up She Goes.” It gives complete facts on Novo WH Hoists.

NOVO ENGINE COMPANY, 214 Porter St., Lansing, Mich.
Clarence E. Bement, Vice-Pres. and Gen. Mgr.

NOVO

PUMPS — ENGINES — HOISTS

Service, parts and sales in over 70 cities

Novo Engine Company
214 Porter St.
Lansing, Michigan

Please send me the new folder “Up She Goes.”

Name

Company

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City

State



SEND FOR

BULLETIN 66-C

THE FAIRFIELD WAY

Fairfield Portable Belt Conveyors

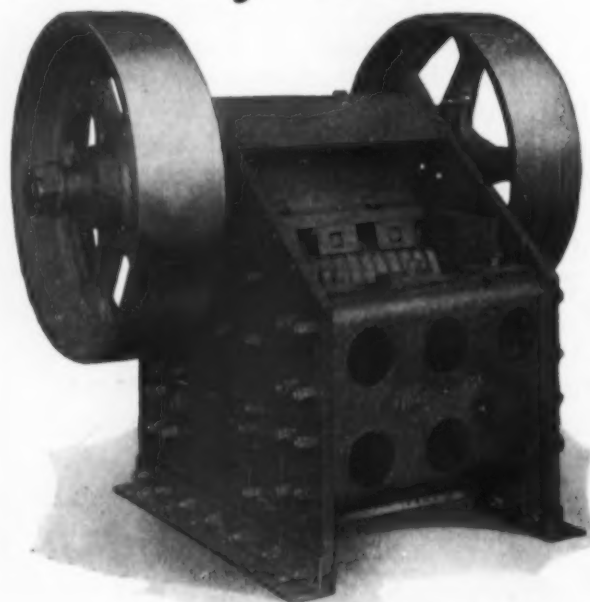
FOR

Sand, gravel, crushed stone, and mixed concrete.

Lengths—20 to 60 ft. Belt widths—20 in. and 24 in. Gasoline or Electric Power.

THE FAIRFIELD ENGINEERING CO.
MARION - OHIO

Best by Test!



No. 1030 Champion Reduction Crusher

Meeting the market demand
for the small sized crushed stone
(1" and under) with

CHAMPION Reduction Crushers

Distinctive—in being equally effective as primary or secondary breakers. The ideal dual purpose crusher for the smaller operator, contractor and chemical or industrial trades. Particularly efficient as a fine reduction unit in large producing plants.

ALSO

CHAMPION ROCK CRUSHERS—PRIMARY TYPE, AND EQUIPMENT FOR THE ROCK CRUSHING AND SAND AND GRAVEL INDUSTRIES. THE ENGINEERING AND INSTALLING OF COMPLETE PLANTS.

The GOOD ROADS MACHINERY CO., INC.
KENNETT SQUARE, PA.



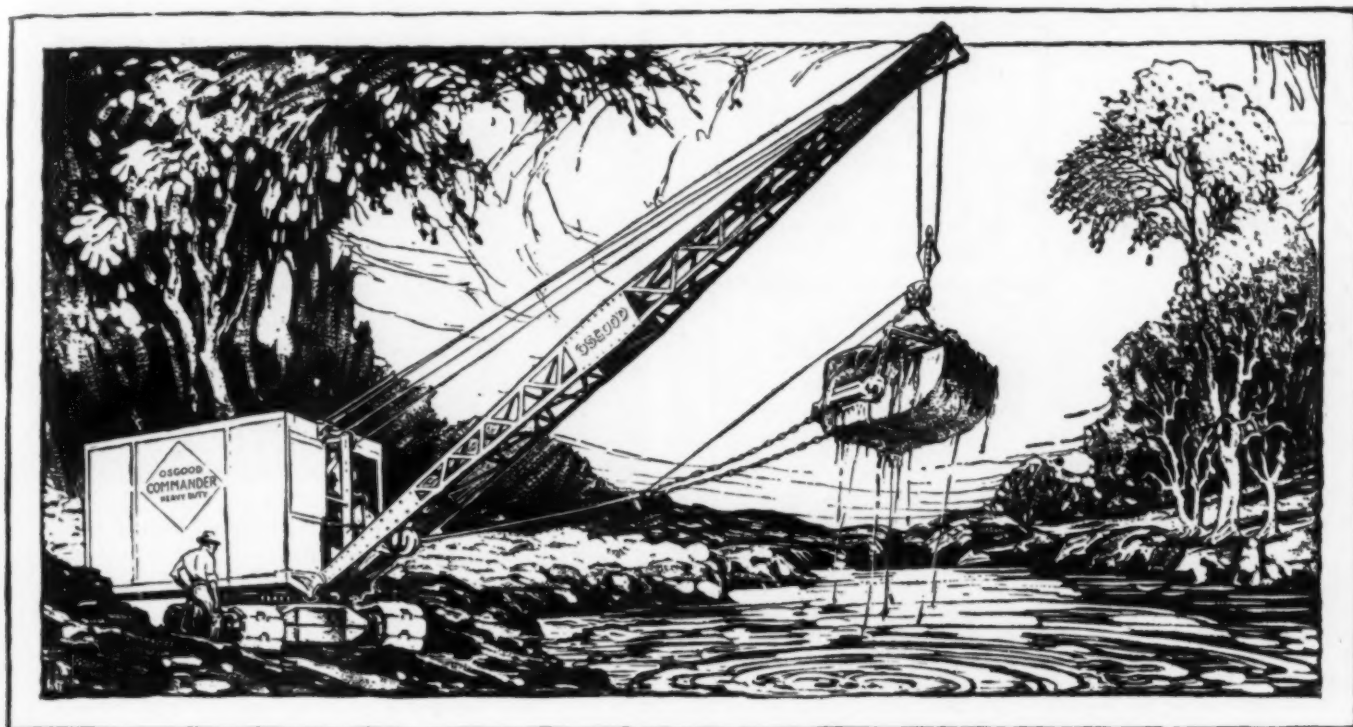
SKF

Self-aligning bearings used throughout.
"The most expensive bearing made."

Branches at
New York
Philadelphia



Pittsburgh
Chicago
Watertown, Mass.



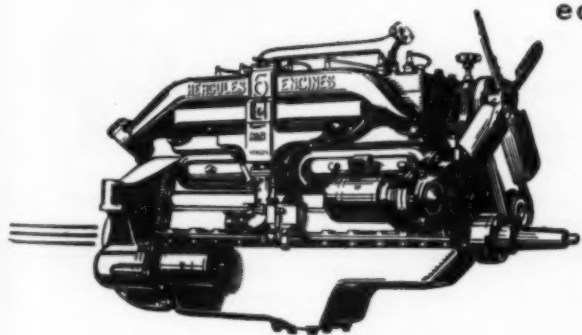
Hercules Powered Dragline Digs an Artificial Lake . .

AT East St. Louis, Illinois, an Osgood Commander Heavy-Duty Dragline, powered by a Hercules Six-Cylinder Engine, was commissioned to dig an artificial lake in a city park. Day after day, this dragline pulled the bucket through muck and heavy clay—another job accomplished with characteristic Hercules speed and reliability.

Hercules Engines are built expressly for such work. Draglines, cranes and clamshells—large and small capacity shovels—and other types of construction and road maintenance machinery do their best work when equipped with Hercules Heavy-Duty Engines.

HERCULES MOTORS CORPORATION
CANTON, OHIO, U. S. A.

West Coast Branch: Los Angeles, Cal.
Mid-Continent Branch: Tulsa, Okla.



HERCULES ENGINES

Just Published
WOOD
Construction

A
REPORT OF THE
NATIONAL COMMITTEE ON WOOD
UTILIZATION
By DUDLEY F. HOLTMAN
707 Pages, 6x9, \$6.00

The keynote of the book is:

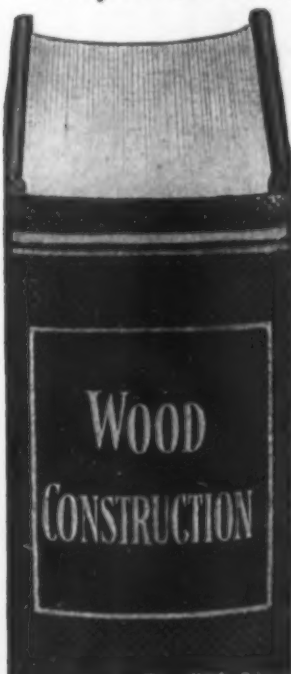
- elimination of waste.
- greater efficiency in the use of wood.
- a large return from the lumber dollar.

The aim throughout has been to give basic information that will aid the user in designing and specifying wood construction and to aid in the efficient selection and application of the material and in the adoption of efficient and economical forms of design.

One of the features of the work is a simple unified system of grading lumber, recently adopted, which can be applied to give the wood user that kind of material which will serve his particular purpose efficiently and economically.

The book contains several hundred diagrams, drawings and tables, among which are specially drawn architectural plates illustrating actual wood-building operations.

Subjects Covered in Wood Construction



The first seven chapters of Wood Construction include information on the factors affecting the use of wood in construction; lumber grading, grade provisions, and working stresses; the principal woods used in building and construction; the identification of common woods; preservative treatment; the use of paints and stains, and methods of preventing termite damage. The last four chapters contain information on approved methods of using lumber in light building construction and mill-work, and in both heavy timber and temporary construction.

In an appendix are given compilations showing the standard grades produced in the various species, and tables of the lumber grades used for various construction purposes.

We will send you a copy for FREE examination.

Fill in and mail the coupon below and a copy of this book will be sent you for 10 days' free examination. No expense—no obligation.

MC GRAW-HILL
FREE EXAMINATION COUPON

McGraw-Hill Book Company, Inc., 370 Seventh Ave., New York.

You may send me on 10 days' approval Holtman's—Wood Construction, \$6.00 net, postpaid. I agree to remit for the book or return it postpaid within 10 days of receipt.

Signed

Address

Official Position

Name of Company

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PROFIT ON SHORT HAUL?



Yes Sir! A train of WARCO Wheeled Scoops and a tractor will move average dirt a distance of 500 feet for from 10 to 15 cents per cu.yd. This includes all costs—operators, gas, oil, depreciation, etc.

WARCO Scoops excavate, transport and spread all in one operation—and in trains of two or three scoops one man handles them.

ASK US TO SHOW YOU.



W. A. RIDDELL CO.
BUCYRUS, OHIO



It is to the men already using Buffalo-Springfield Rollers that we direct you for a frank, unbiased opinion of their practical worth. They, of all men, can best explain why the Buffalo-Springfield is, and long has been, the leader among road rollers.

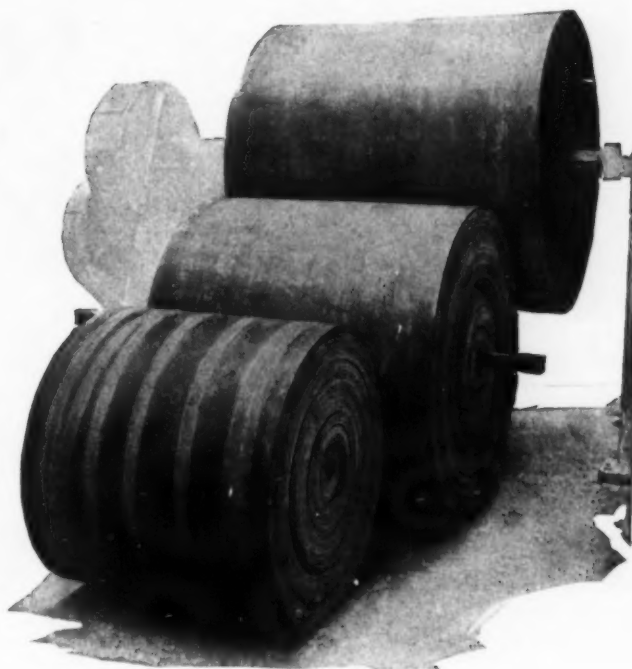
Various models, steam and motor driven. All practical sizes. Scarifier and other attachments when desired. Booklet upon request.

The Buffalo-Springfield Roller Co.
Springfield, Ohio

BUFFALO - SPRINGFIELD

Record Maker Conveyor Belting

Record Maker Conveyor Belting got its name from its reputation for service, and, Republic intends that it shall live up to both the name and reputation.



REPUBLIC makes every effort to serve the consumer in the quickest, most convenient manner possible. Idle stock sometimes means deterioration and always means the expense of space rent, insurance and handling. The Industrial Supply Distributor, because of his knowledge of markets, of economic trends and of quick, effective distribution can eliminate most of your problems of supply and demand. Ask your distributor about his service and Republic rubber.

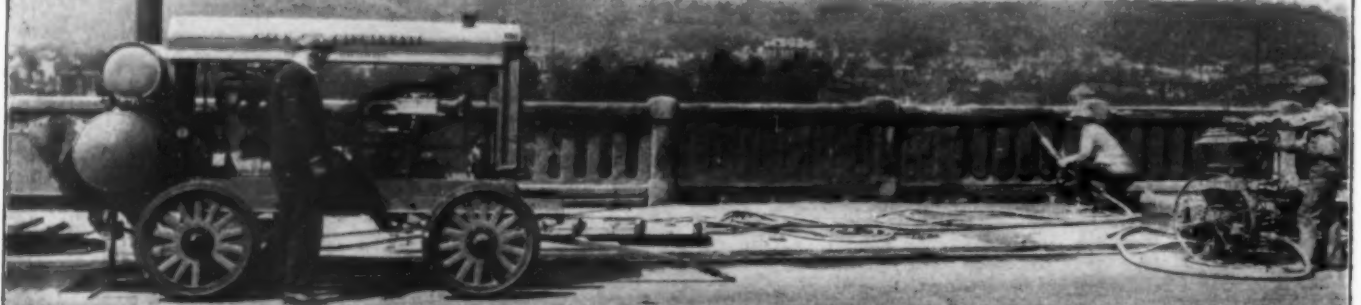
THE REPUBLIC RUBBER CO.
Youngstown, Ohio

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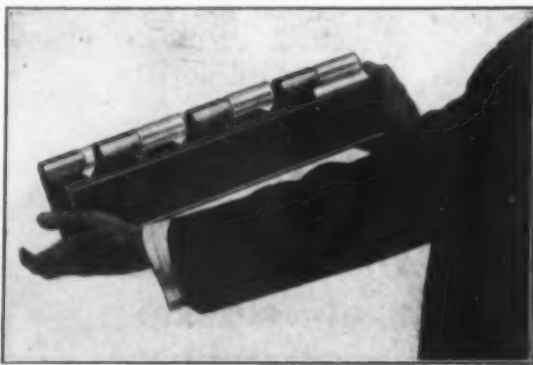


**City of Cincinnati, Bureau of Highways, using
210 cu. ft. M-W "AIR KING" to operate cement
gun on bridge repair work**

METALWELD, INC., 26TH & HUNTING PARK AVE., PHILADELPHIA
DEALERS IN PRINCIPAL CITIES



METALWELD-WORTHINGTON
PORTABLE AIR COMPRESSORS



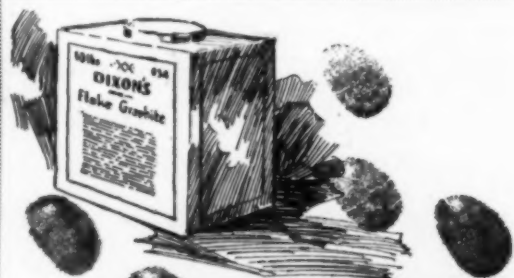
The UNIVERSAL SAND TESTER

This little instrument will tell you whether your sand is good or poor *before* you use it, and give you the facts with a permanent record, quickly and cheaply.

It can be used in the laboratory, at the sand bank or on the job.
Send for booklet "About Sand."

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Send me your booklet "About Sand" and put my name
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DIXON'S fingerprints

written in FLAKE GRAPHITE
for more than 100 years

This is the identifying mark of Dixon's... Graphite. The combination, Dixon's and Graphite, have been synonymous all over the world for more than 100 years.

And, another word that is closely linked with these two is—lubrication. These three are inseparably linked in the minds of thousands of mechanics, maintenance men, and engineers, for unquestionably Dixon's Flake Graphite has its place in every well planned scheme of lubrication, and as an auxiliary lubricant with oils and greases it is generally recognized as benefiting the base lubricant.

If you have never had the *how, where and why* of Dixon's Flake Graphite lubrication explained to you, write for it today. Or, better still, send us an outline of your lubricating problems and we'll tell you how Dixon's can help you.

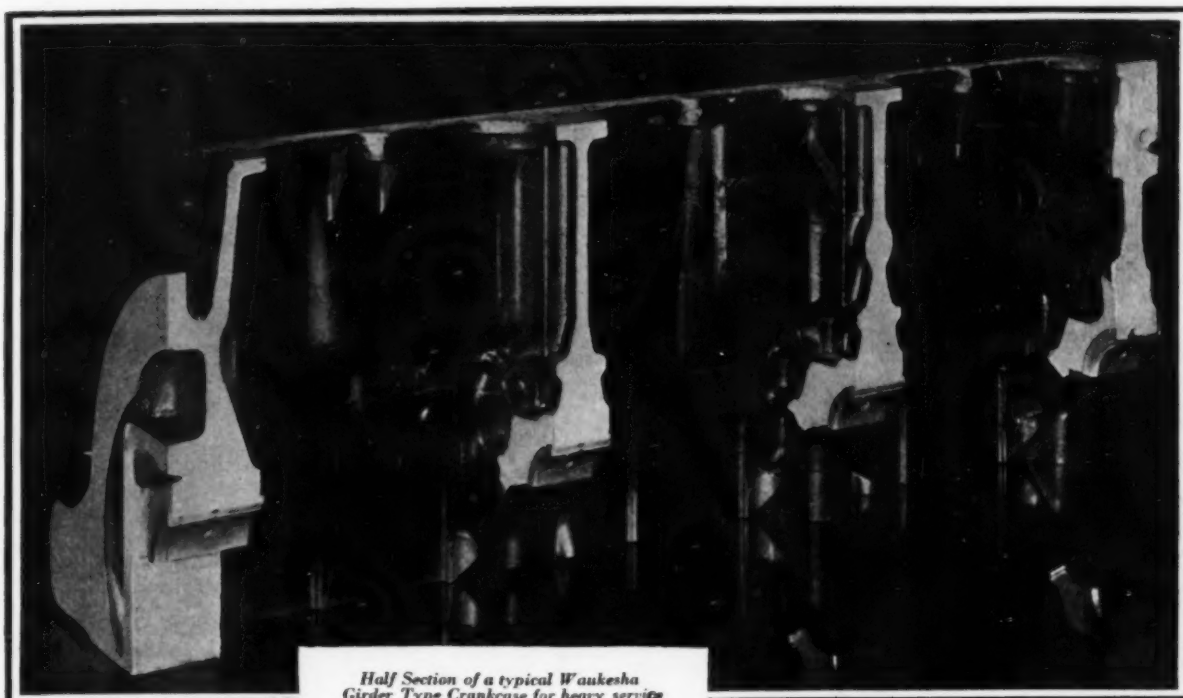
Joseph Dixon Crucible Company

Jersey City



New Jersey

Established 1827

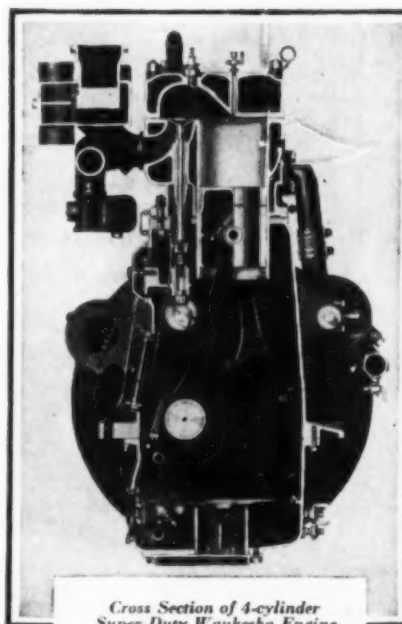


Half Section of a typical Waukesha
Girder Type Crankcase for heavy service

A deeper crankcase[~] ...for... longer life

THE RIGIDITY of Waukesha Super-duty Engines does not depend entirely upon their overstrength crankshaft. The Waukesha patented "girder" type crankcase is also designed for extra rigidity—both in bending and torsion.

Waukesha's super-duty cylinders are held by flanges midway up on the barrel, making the crankcase six or eight inches deeper. Its ribbed cross walls are combined with wide bottom flanges. Behind the valve tappets, running the entire length of the engine, is an extra rib that helps tie the four cross walls together. This construction increases stiffness and rigidity tremendously. Maximum bearing life is thus assured, as well as extreme smoothness and freedom from destructive vibration. Bulletin No. 540 gives all details. Write to *Industrial Equipment Division, Waukesha Motor Company, Waukesha, Wisconsin, Offices: 8 West 40th Street, New York—7 Front Street, San Francisco.*



Cross Section of 4-cylinder
Super-Duty Waukesha Engine

963

WAUKESHA ENGINES

It handles like a 7S.... but it holds 2 Bags

**Jaeger Gains 50%
Extra Strength...Throws
Off 1000 Lbs. Dead Load
to Build this Faster, more
Portable 10S Mixer**

Built of steel
Short coupled, direct
driven
100% ball bearing
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Chilled ground faced
rollers
Big drum openings

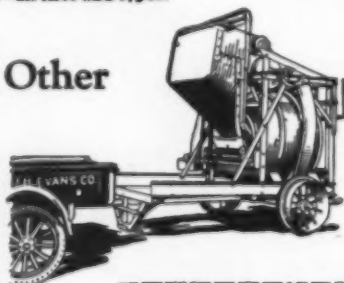
One man control
Automatic Skip Shaker
Fast accurate measure
water tank
Spring hung chassis
Dual tire wheels, roller
bearings
Minimum wear and
power consumption



Other Non-Tilters in 7, 14, 21, 28
ft. Sizes.
Tilters 3½, 5, 7, 10, 14 ft.
Pumps—all sizes and types.

Outselling all Other 7S Mixers

Sensational one-bag Speed
King trailer with end dis-
charge—low charge or
loader type. Write for
special price.



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800 Dublin Ave., Columbus, O.

Send catalog, prices and terms on

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7, 10, 14, 21, 28 ft. 1 and 2 Bag 3½, 5, 7, 10, 14 ft.

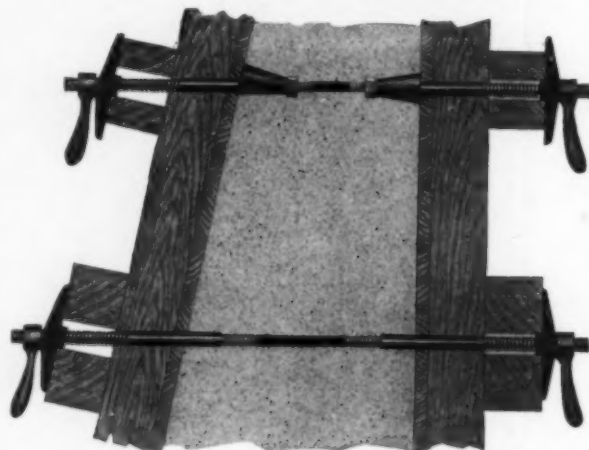
☐ Contractors Pumps—Towers—Hoists
(Check where interested)

Name _____

Address _____

Date _____

WILLIAMS Form Clamps for battered or vertical walls



Clamps may be widely spaced. Inside Rods are surpris-
ingly cheap. Sizes ¾-in., ½-in., ⅜-in. and tensile
strength 7,200, 14,000, and 20,000 pounds. Labor saved
in constructing and stripping forms. Clamps permit con-
tinuous pouring and give water tight walls, as no metal
is left within 1-in. of the surface. Write for full
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aggressive distributors.

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101 Campau Avenue, Grand Rapids, Michigan

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The Buhl Company
Old Colony Bldg.
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Western Small Tools Are The Best Small Tools



Two-Purpose Grading and Rooter Plows



Fresno Scrapers, made in 5 sizes



Rotary Fresno, made in 2 sizes



Tumblebug Scraper, capacity 1 cubic yard



Wheeled Scraper, made in 5 sizes

For more than 50 years the Western Wheeled Scraper Company has been building plows and scrapers of all kinds for the earth-moving contractor. During that time Western Small Tools have become the standard and today are the best to be had. The present line of Western tools is the sum of the years of experience in designing and building this equipment.

Any equipment is valuable in proportion to its ability to do work at low unit cost. Westerns are famous for this quality. When you buy Westerns you pay for good tools and you get good tools capable of doing the most work at the lowest production cost.

Specify Westerns on your next order and note the difference. You will be using your Westerns when ordinary small tools are on the scrap pile.

The complete Western line of plows, drag scrapers, fresno scrapers, and wheeled scrapers for use with stock, rotary fresnos and tumblebug scrapers for use with tractors, and other tools, is fully described in catalog W-29ED. Where shall we send your copy?

Western Wheeled Scraper Company

Aurora, Illinois, U. S. A.

WESTERN

FASTER AND BETTER CURING
GRASSELLI **R-B**
SILICATE OF SODA

When you use Grasselli "R-B" for curing concrete roads and streets, you reduce your overhead by eliminating the largest part of the curing gang. Two men with brooms or spray rig do the whole job without dirt, delay or argument.



Brooming "R-B" on road surface



Spraying "R-B" on concrete base

You owe it to yourself and to the public to get complete information on this latest and approved method that insures better roads at less cost.

Literature showing how "R-B" saves time, work and expense will be gladly sent on request.

THE GRASSELLI CHEMICAL CO.
 Founded 1839 Incorporated
 Cleveland, Ohio Branches in 18 cities

GRASSELLI GRADE
A Standard Held High for 90 Years

C7
*A Worthy
 Successor!*



The Cleveland C6 Paving Breaker has long been noted for its ability to save regularly 50% of the cost and 75% in time over hand methods.

Now comes the Cleveland C7. More punch, more power, more speed to give greater all-around productiveness!

To those who use paving breakers we say don't overlook the C7. Let us demonstrate its capabilities. Give it a trial on your work. For an appointment write—

The Cleveland Rock Drill Co.
 3734 E. 78th St., Cleveland, Ohio

*Branches, Agents and Service Stations
 in Principal Cities of the World*

**CLEVELAND
 ROCK DRILLS**

MODEL "B" CLAMSHELL

ON HIGHWAY
CONSTRUCTION

Owned and Operated
by

**OBERG BROTHERS
BRIDGE CONSTRUCTION CO.**

LOS ANGELES, CAL.

Model "B" Clamshell

Designed and Engineered for High
Efficiency in its own Particular Field.

There are hundreds of jobs that can be handled more efficiently and with lower costs by the use of this 3/8 yard clamshell, just as small, speed trucks are better for package delivery than their big five ton companions. The work you have to do governs the proper selections of equipment for excavating and material handling. Let our engineers analyze your work. You'll find their recommendations sound.

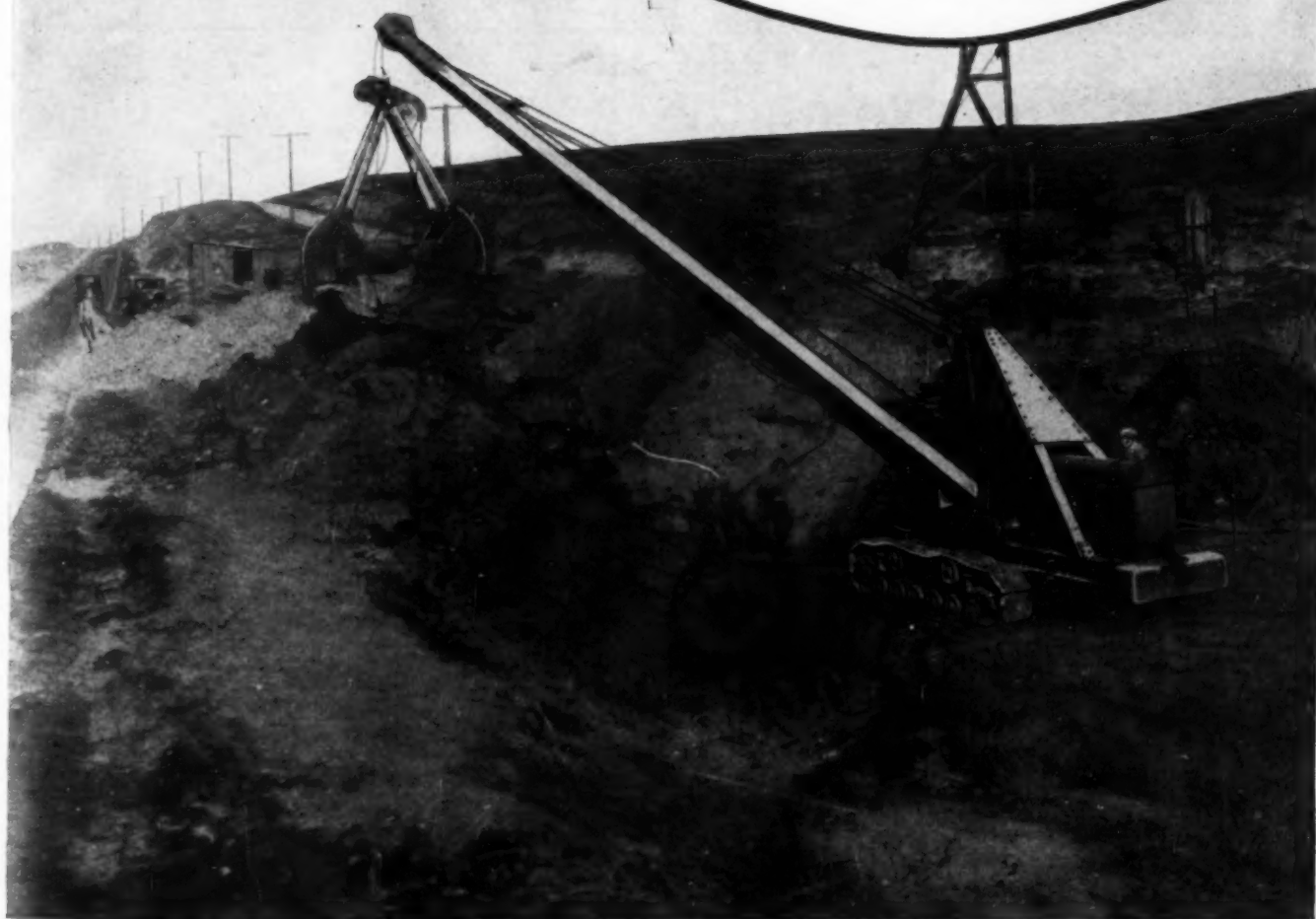
The Model "B" clamshell shown here, is quickly converted to power shovel, crane, dragline, trench hoe and backfiller.

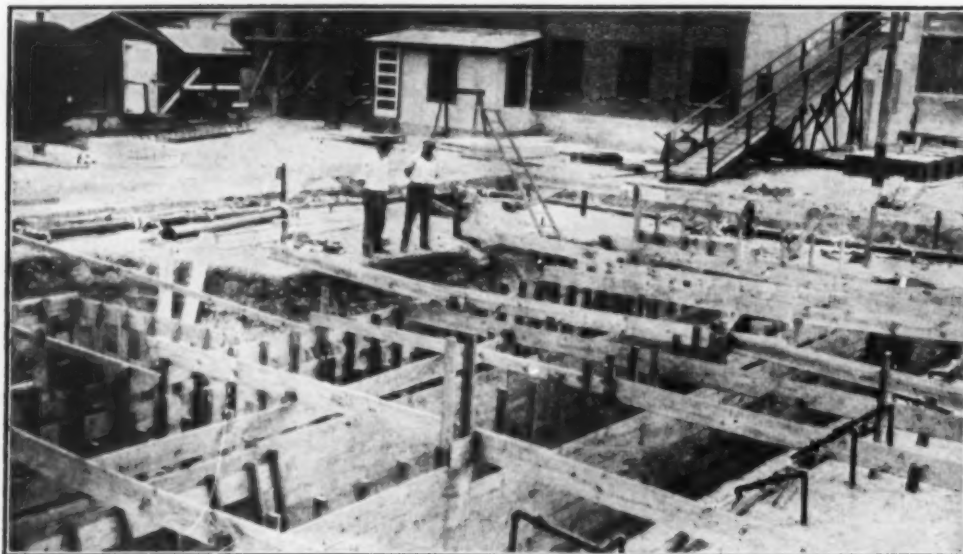
Descriptive literature and operating data will be mailed without obligation, upon request.

Universal Power Shovel Company

Division of Unit Corporation of America

15841 Second Boulevard
Detroit, Michigan





"I STRUCK QUICKSAND"

That time honored alibi is played out. WATER and SAND make QUICKSAND. The Moretrench Wellpoint System takes care of the water. You can handle the sand. Mud and water is a harder proposition. Moretrench can take care of that, too. Or anything else—from a shallow shore ditch, to a boiling cofferdam bottom—with deep water outside.

MOORE TRENCH MACHINE COMPANY, Rockaway, New Jersey



No Matter—
Why you move
Where you move or
How you move



Please change my
mailing address—

CONSTRUCTION METHODS,
Tenth Ave. at 36th St., New York City, N. Y.
I have moved FROM

Name

Street

City State

TO

Street

City State

Company Employed by
or Business Connection

Nature of Business Title

Make sure *Construction Methods*
follows wherever you go.

And then, no matter where you move
to all that *Construction Methods*
needs is your old and new address.

If you have a new job in view, fill
in the coupon and *Construction*
Methods will be there to aid you
with timely tips and helpful hints.
Whenever you move be sure to

USE THE COUPON



Austin Mammoth Senior Leaning Wheel Grader. The unquestioned leader of leaning wheel graders in weight, strength and ability to do a tremendous amount of work regardless of difficulties. Read these "Mammoth" features: Leaning wheels and telescopic rear axle. Disc wheels with removable rims—strong, non-clogging. Improved, fast operating leaning wheel mechanism. Blade reversible from platform. Heavy "Z" bar gooseneck. Cast steel circle. Steel channel pole. Alemite lubrication.

Cut grading costs with Austin "full blade" performance

Austin Leaning Wheel Graders reduce road grading expense because they *always* work at full capacity and can be operated in places that could ordinarily be worked at only half capacity or less. Unfavorable grading conditions and rough ground have little effect on the working efficiency of these graders. The blade can be set in the desired position and the wheels and rear axle can then be adjusted so that the job will be handled with maximum efficiency. This "full blade" performance enables the Austin to do—in *one trip*—work that would take ordinary graders several trips to accomplish.

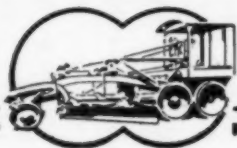
Austin Leaning Wheel Graders combine the

advantages of *leaning wheels* and *telescopic rear axle*—a combination exclusive to Austin. A simple adjustment changes the rear axle from the shortest to the longest on any grader (or to intermediate positions) and it can thus be made to fit job requirements that would be impossible for standard axle graders.

Let us send interesting information explaining how maintenance costs can be reduced by using Austin Leaning Wheel Graders. The Austin-Western Road Machinery Co., 400 North Michigan, Avenue, Chicago Illinois. Branches in principal cities.

Austin-Western ROAD MACHINERY

THE NEW



DUAL DRIVE

Protect yourself!
with simple and direct
LIGHT
from a dependable source

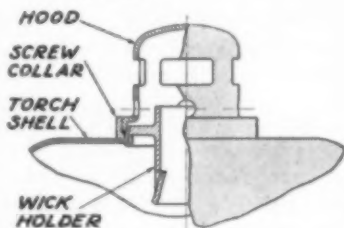


*in other words
always use the*

TOLEDO TORCH

PRETTY colored lanterns may get you by with cautious drivers, if you hire a watchman to keep them on the job. But it's the reckless ones who cause all the accidents. With them the use of uncertain signals, such as red lanterns, is a needless risk for you to take, especially when it is so much more costly than using TOLEDO TORCHES.

The New TOLEDO TORCH is dependable in all kinds of weather, is very economical in the use of fuel, and is never molested by petty thieves. The secret of its great success lies in the new ECONOMY BURNER. (Patents Pending)



IT is the only burner that will give you satisfactory service at all times. Observe carefully its construction, and insist on having the genuine. Similar looking imitations do not compare in performance.

Ask for the 'Champion'
"the harder it blows the better it burns"

Made only by

THE TOLEDO PRESSED STEEL CO.
TOLEDO, O.



A Sensational Performer and Money Saver

THE speed, versatility, rugged construction, big yardage and low cost of the Fundom combination shovel, ditcher and crane, make it a sensational performer and money saver.

It makes small jobs profitable. Fast, full $\frac{3}{4}$ circle swing, $\frac{1}{3}$ yard dipper capacity, $16\frac{1}{2}$ foot radius, gasoline power.

With Trench Hoe attachment for ditching or Boom Extension for clamshell, dragline or crane, the Fundom is an unbeatable three-in-one digging machine.

Get the details and name of nearest dealer. Address—

The Fundom Hoist & Shovel Co.
314 Central Building, Lima, Ohio

OK

PORTABLE ELEVATOR

for

BUILDING CONTRACTORS
CEMENT CONTRACTORS
BRICK and STONE MASONS
PLASTERERS

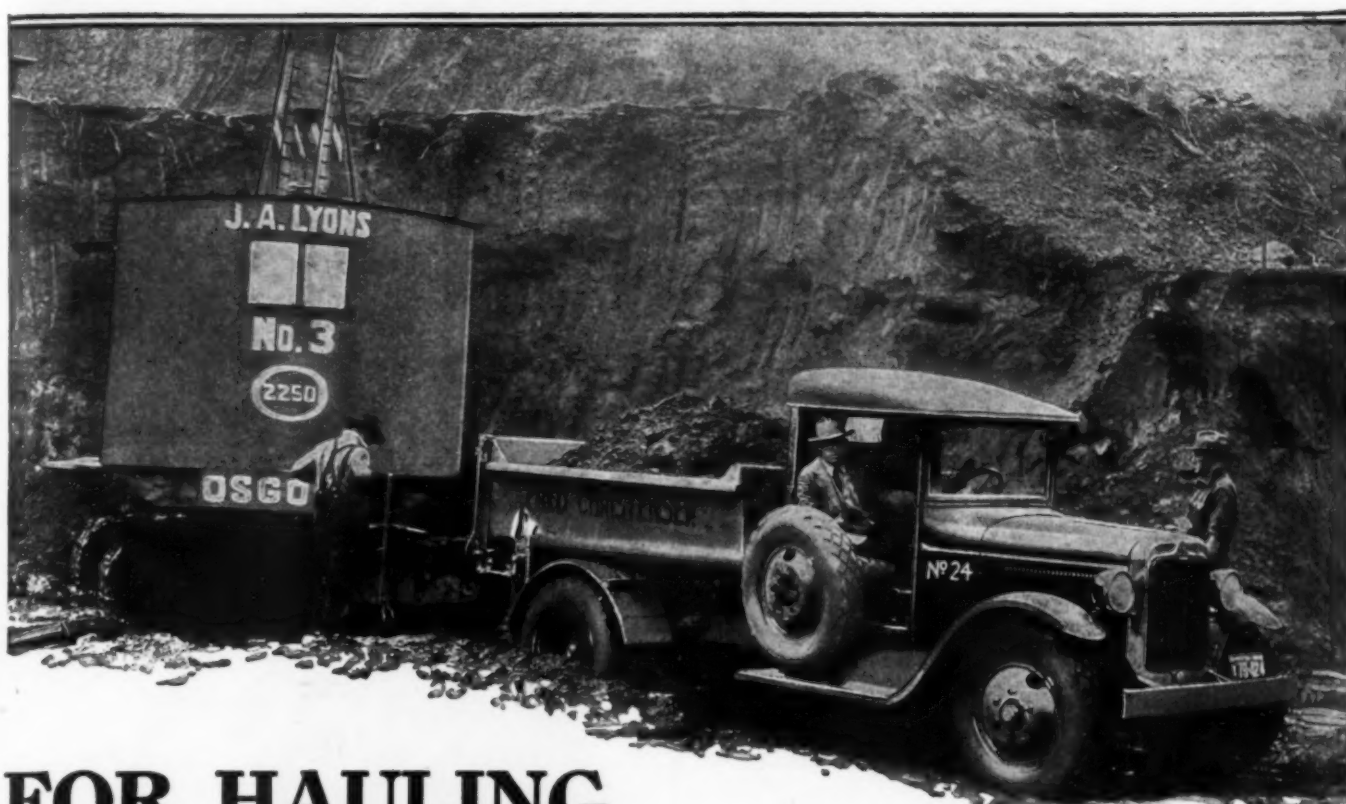
The O.K. Elevator is portable and easily erected. By the removal of only a few bolts, the entire elevator may be dismantled for moving. It may be loaded on a truck and taken to the next job, where it is just as quickly erected, ready for work again. The entire time required for erecting the elevator to a height of 26 feet is about two hours. A Profitable Proposition for live agents. Write.

O.K. Portable Air Compressors
—O.K. Hoists.

O. K. Clutch and
Machinery Co.

P. O. Box 305
Columbia, Penna.





FOR HAULING on time any time at low cost every time—Dodge Trucks

For any hauling job, Dodge Trucks are safe, dependable workers. Grade or full loads, they pull with sureness. Open road or in the get-away, their speed and pick-up insure more miles, more trips, more material hauled.

On the cost sheets—of any owner they now serve—Dodge Trucks show records hard to better In operation and in upkeep, their cost is surprisingly low. Low

first cost and long life add still more to their economy. Test Dodge Trucks with your needs in mind. Compare these rugged, modern workers with any other truck, no matter what its price. Go over the complete line with your Dodge Brothers Dealer. He can deliver the correct chassis, complete with the right body, ready for your service.

You can put a Dodge Truck to work on any hauling job with

full assurance that it will save money on that job. Thousands and thousands of users of Dodge Trucks will tell you so.

PRICES

MERCHANTS EXPRESS—	
109" wheelbase (4-cyl.) . . .	\$ 345
COMMERCIAL TRUCK—	
120" wheelbase (6-cyl.) . . .	775
1-TON—133" wheelbase (4-cyl.) . . .	745
1-TON—133" wheelbase (6-cyl.) . . .	845
1-TON—140" wheelbase (6-cyl.) . . .	
Heavy Duty	1065
1½-TON—150" wheelbase (6-cyl.) . . .	1345
1½-TON—165" wheelbase (6-cyl.) . . .	1415
2-TON—150" wheelbase (6-cyl.) . . .	1515
2-TON—165" wheelbase (6-cyl.) . . .	1585
3-TON—135" wheelbase (6-cyl.) . . .	1745
3-TON—165" wheelbase (6-cyl.) . . .	1775
3-TON—185" wheelbase (6-cyl.) . . .	1845

Chassis f. o. b. Detroit

DODGE BROTHERS TRUCKS



CHRYSLER
MOTORS
PRODUCT

SOLD BY DODGE BROTHERS DEALERS EVERYWHERE



Practical Men use the Starrett Transit No. 99

No. 99B
Plain sight tube
—extension
legs—plain
level vial—
wooden carry-
ing case \$20.00



No. 99F
Telescope—ex-
tension legs—
ground level
vial—wooden
carrying case
\$40.00

Simple as A B C to use, the Starrett Transit No. 99 is ideal for laying out building lots, foundations, new roads, drainage systems, work you can easily do yourself without any technical knowledge.

Check the low cost of this Starrett instrument, it's priced for practical men. And notice these features, graduated arc for horizontal angles, graduated arc for vertical angles, adjusting screws easily level the head, with plain or telescope sight tube, plain or ground level vial, and extension legs. It gives a complete range for any type of work and you can depend on Starrett quality.

Mail the coupon for the NEW Starrett Transit Book. Just out. A valuable text book, fully illustrated, on practical, every day problems. Write for it today. . . .



Use Starrett Tools

THE L. S. STARRETT CO.
ATHOL, MASS.

Please send me a free copy of the NEW Starrett Transit Book "NF".

Name _____

Address _____

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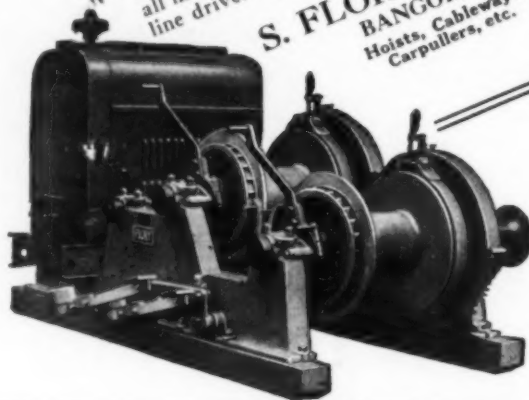
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2061

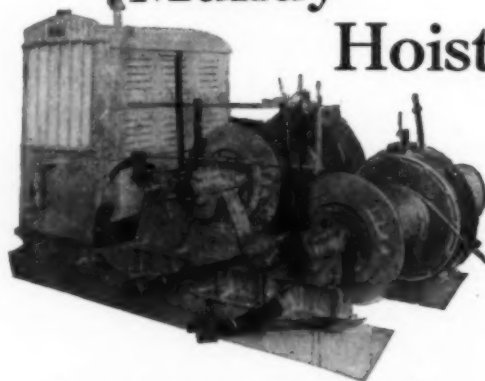
FLORY

THE "FLOR-OX" 35 HAS
these many new features that make it the ideal hoist for general construction work—roller bearing thrusts for greater efficiency, less weight and space with friction levers, positive release device on friction shafts at 165 feet per minute, extra heavy shafts and bearings, silent chain drive enclosed in dustproof casing and machine cut teeth on all main gears and pinions. Electric or gaso-line drive. Write for bulletin.

S. FLORY MFG. CO.
BANGOR, PA.
Hoists, Cableways,
Carpullers, etc.



Mundy Hoists



Standard of the World

Gasoline—Electric—Steam

Built up to a standard
Not down to a price.

Car Pullers—Cableways

J. S. Mundy Hoisting Engine Co.

722 Frelinghuysen Ave., Newark, N. J.

TRADE MARK
MUNDY
ESTABLISHED 1869

Export Office, 30 Church Street, New York City
Cable Address: BROSITES

What's Mine is My Own

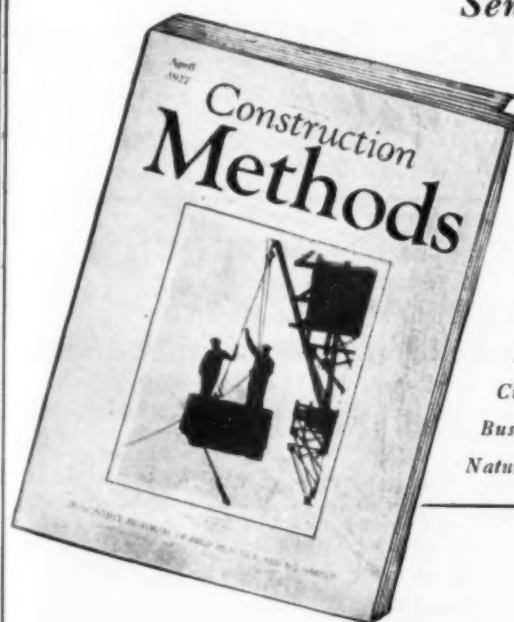
I do with it as I please—when I please—and how I please. I don't have to borrow what's mine—nor must I return it. I share it if I wish—but first and last, it's mine—for my own use.

My copy of *Construction Methods* comes to me regularly each month. It is the field engineer's most valuable means of keeping in touch with the new developments of modern civil engineering and construction. I need it—and I wouldn't be without it. Nor do I want to read it after others have torn out the most interesting articles for their own use. I want the news complete, and I want it while it's new.

When pictures and items are cut or missing—when you see each issue two weeks late, or not at all—when others have used *Construction Methods'* ideas long before you read about them, you are not getting full value, or the help to which you are entitled through this paper.

You need your own copy. Be sure to get it.

Send the Coupon NOW



CONSTRUCTION METHODS Tenth Ave. at 36th St., New York, N. Y.

Send me my own copy of *Construction Methods* each month for the next two years. Here's my dollar bill—sent at your risk.

Name

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Business Connection

Nature of Business Title

The mighty midget does its stuff...

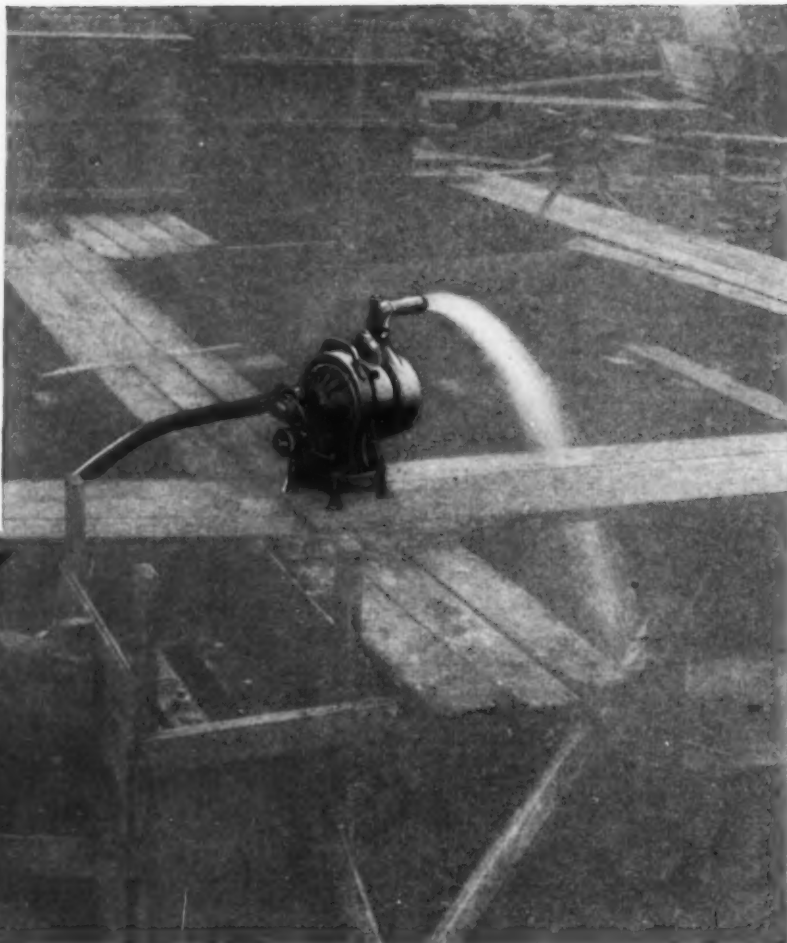
See the little Self Priming Homelite Portable Centrifugal Pump. A pint a minute if that's all there is or 6000 gal. per hour. Weighs less than 100 lbs. complete with built in air cooled gasoline engine yet stands heavy service for years. It's built to labor and to last.

A distributor near you will demonstrate on your job. Ask us for his name and address.

HOMELITE Self Priming PORTABLE CENTRIFUGAL PUMP

HOMELITE
CORPORATION
75 Riverdale Avenue,
Port Chester, N. Y.

Ⓢ 3740



HUMDINGER PUMPS

Non-clogging, everlasting rubber ball valves, totally enclosed, running-in-oil jacks, bronze bushed bearings, all steel trucks, and enclosed engine crank cases make HUMDINGER PUMPS.

THE CONTRACTOR'S CHOICE

Full detail description given in Bulletin No. 1034 CM. Send for a copy.

RALPH B. CARTER CO., 53 Park Place, New York

Factory: Hackensack, N. J.



SAFETY IN UNDERPINNING

Is assured by use of

WATSON-STILLMAN Independent Pump Hydraulic Jacks

Accurate—Dependable—Easy to Repair

These Jacks are being used extensively by Underpinning and Foundation Contractors for underpinning work, sinking piles under foundations and making tests of footings.

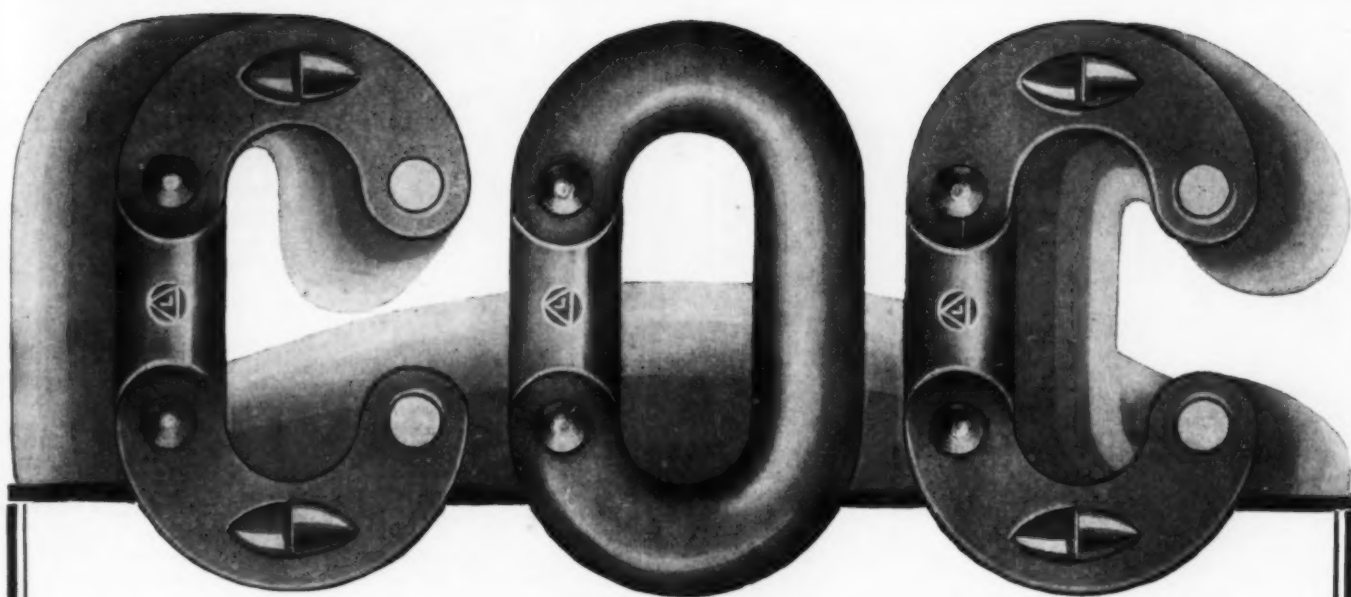
We make a full line of other types of jacks, and also many hydraulic devices suitable to the contractor's needs, such as concrete testing presses, benders, shears, pumps, punches, valves, tunneling shields, etc. *Write for Catalogs*

THE WATSON-STILLMAN CO.
1014 Evening Post Bldg., New York City

Chicago
Philadelphia

Pittsburgh
Richmond
St. Louis

Cleveland
Detroit



THE ORIGINAL

Missing Link

THE GENUINE



Of drop forged steel and great strength. Note the interlocking lugs and the big husky rivets.



Time on a job is money. Use MISSING LINKS and save time. Sizes $\frac{3}{16}$ " to $1\frac{7}{8}$ ". Sizes 1" and larger have reinforced rivet holes. Look for the Laughlin trademark.



The **THOMAS LAUGHLIN COMPANY**

PORTLAND, MAINE

Wire Rope Fittings \ Drop Forgings \ Marine Hardware

NEW YORK — CHICAGO — SAN FRANCISCO — SEATTLE — LOS ANGELES



Twin 74-inch Lock-bar Steel Pipe line installed for the Wanaque Aqueduct, North Jersey.

No Experiment

—reliability proved by 25 years satisfactory service in installations all over the continent.

ONE of the greatest sources of satisfaction to the engineer specifying Lock-Bar Steel Pipe is its proved dependability. There is scarcely an important city on the continent that has not installed Lock-Bar Pipe during the past 25 years. Millions of feet in the ground giving satisfactory service testify to its supreme reliability.

EAST JERSEY PIPE COMPANY
7 Dey Street, New York City

LOCK-BAR
STRONG AS THE  PLATE ITSELF



Note how efficiently this Bull Frog No. 64 is designed to put the load *on the wheel*, and how the extended, reinforced handles serve as a wheel-guard for easy forward dumping. Note the shaped handle-grips—the angle-iron legs with replaceable malleable iron shoes—the substantial bracing of both frame and tray. These factors, together with the lasting sturdiness and easy-running qualities of the grease-pocketed Never-Break Wheel—an exclusive Bull Frog feature—account for the popularity of this long, narrow, deep-tray model on construction jobs. Our new catalog describes this and other efficient Bull Frog barrows, carts and scrapers for every contracting and industrial use. Write for it.

THE TOLEDO WHEELBARROW CO.
TOLEDO, OHIO

Branch Office and Warehouse
Chicago—69 E. Wacker Drive

BULL FROG
WHEELBARROWS

Business Wants

THE *Searchlight* Section of this paper represents a meeting place for men and concerns who have immediate business “wants” to fill—the section covers

Agencies Wanted
Agents Wanted
Books and Periodicals
Business Opportunities
Civil Service Opportunities
Contracts Wanted
Desk Room for Rent or Wanted
Educational
Employment Agencies
Employment Service
Foreign Business
For Exchange
For Rent
For Sale
Franchises
Labor Bureaus
Miscellaneous Wants

New Industries Wanted
Office Space for Rent or Wanted
Partners Wanted
Patent Attorneys
Patents for Sale
Plants for Sale
Positions Vacant
Positions Wanted
Property for Sale
Representatives Wanted
Salesmen Available
Salesmen Wanted
Spare Time Work Wanted
Sub-Contracts Wanted
Tutoring
Vacation Work Wanted
Work Wanted

“SEARCHLIGHT”



240 cu. ft. per minute compressor.

Power for the big JOBS!

A "SCHRAMM" multi-cylinder compressor stays on the job and keeps the tools supplied with full pressure at all times with minimum attention. Why?

Simple, large capacity compressor.
Powerful, absolutely dependable Buda engine.
Self-aligning clutch feature for easy starting.
Gasoline strainer on gas line and air filters on both engine and compressor.
Pressure control-unloader pilot valve with special slow-down speed control during idling period.

Get our specifications and prices. State mounting desired.

Schramm

Inc., Manufacturers
West Chester, Penna.
Offices and Representatives in Principal Cities

BAKER MANEY Self Loading Scrapers

The original self-loading scrapers continue to show their ability to move large quantities of dirt with two or three men. They dig, load, haul, dump and compact the dirt as a single outfit.

They are available in three sizes— $\frac{3}{4}$, 1 and $1\frac{1}{2}$ cubic yard capacities to suit your job or your tractor.

Write for these Baker Bulletins

- Bulletin No. 263 Baker Maney Scrapers ☐
Bulletin No. 256 Baker Rotary Scrapers ☐
Bulletin No. 270 Baker Road Maintainers ☐

The Baker Manufacturing Co.
567 Stanford Avenue, Springfield, Illinois



Saved One Dollar on Each Door

On the new Pittsburgher Hotel, the carpenter contractor saved an average of \$1.00 per door by the use of an ALTA Electric Lock Mortiser. It's the fastest tool of its kind on the market and it is absolutely accurate.



Cuts for lock and face-plate in one operation. Used on the largest and finest hotels, office buildings, etc., in the world.

Can you afford to be without this labor-saving equipment?

GIVE IT A TRIAL AT OUR EXPENSE
When will your doors be ready?

WAPPAT
GEAR WORKS, INC.

DIVISION OF SIMONDS
Saw and Steel Company
44 No. Braddock Ave.
Pittsburgh, Pa.

Name
Address
City

Greatest • Fastest mixing • Minimum capacity cost of operation

All these qualities of Iroquois Asphalt Mixing Plants are of the utmost importance to contractors and municipalities. They indicate the high perfection attained through more than forty years' experience in the construction of asphalt pavement, and upwards of a quarter-century's experience in the designing of equipment for that express purpose.

Iroquois Asphalt Mixing plants are not only equal to every requirement, but their output actually far exceeds their guaranteed capacity. Among the latest improvements is a steam-jacketed pump for delivering asphalt from the melting kettles to the weigh bucket, with a rated capacity of 50 gallons of asphalt per minute. The asphalt end of the pump is completely steam-jacketed and has only three moving parts.

Iroquois Asphalt Mixing Plants are made with guaranteed capacities of 400, 1,000, 1,500 and 2,000 square yards. Portable or stationary; electric or steam driven. Write us and we'll gladly send you full details, together with complete information about the entire Iroquois Line—driers, rollers, paving tools, and all equipment for street-paving and road-building work.

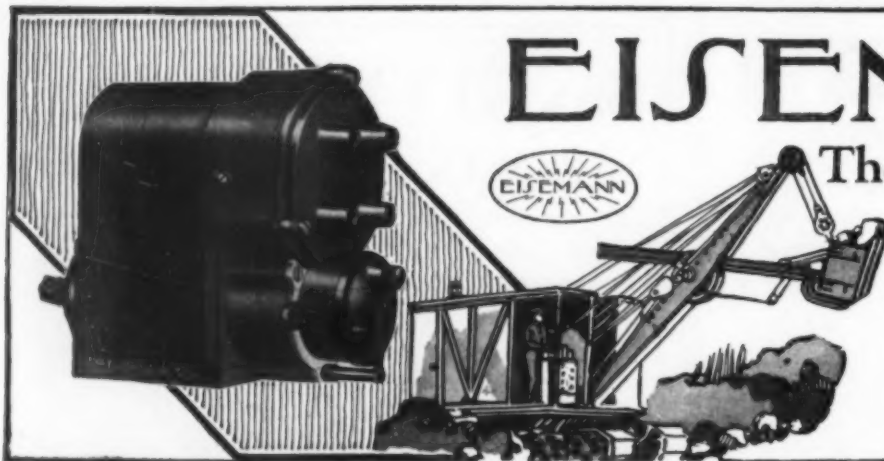
Iroquois Sales Department

The Barber Asphalt Co.
Philadelphia

New York Chicago Pittsburgh
St. Louis Kansas City San Francisco



Illustration shows the Iroquois Three-Unit Portable Asphalt Mixing Plant, with guaranteed capacity of 1,500 square yards of 2-inch sheet asphalt topping per day. Note arrangement of steam-jacketed pump.



EISEMANN

The Foremost Magneto

for Construction Equipment

The overwhelming choice of the builders of high quality equipment. Favored by contractors everywhere.

EISEMANN MAGNETO CORPORATION
165 Broadway - New York

HUBER

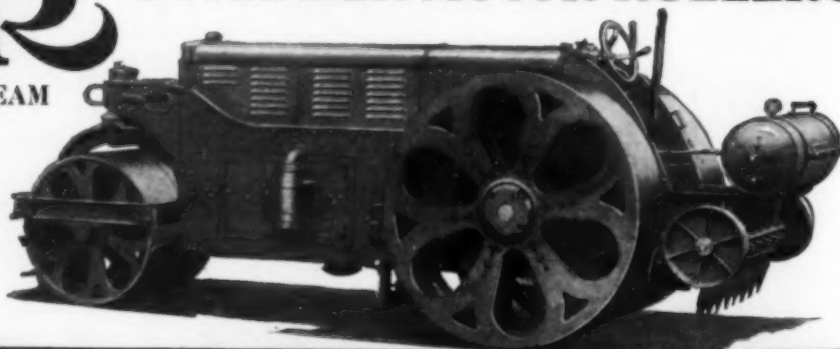
4 CYLINDER MOTOR ROLLERS

POWERFUL AND DEPENDABLE AS STEAM
EASY TO HANDLE
SINGLE LEVER CONTROL

MADE IN FOUR SIZES

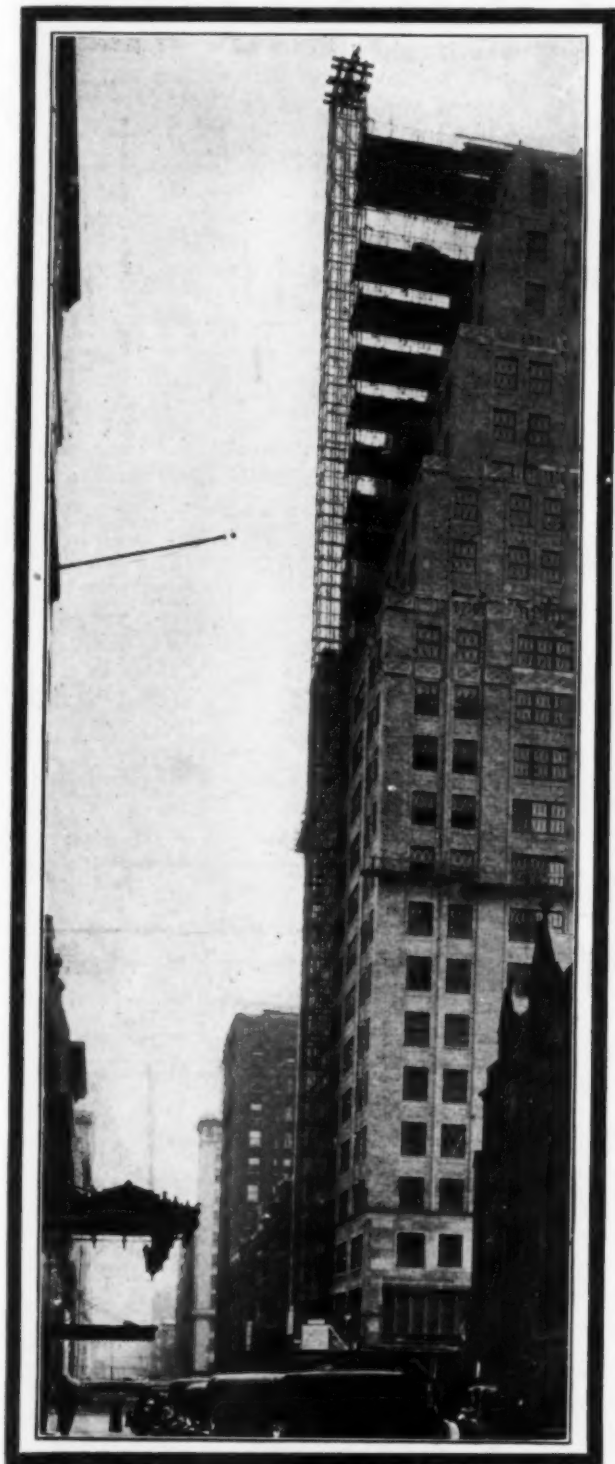
5-7-10-12
tons

SEND FOR
HUBER ROLLER CATALOG



315 E. CENTER ST. THE HUBER MANUFACTURING CO. MARION, OHIO

American Tubular Towers



COLUMBIA BROADCASTING BUILDING
New York City
D. P. Robinson & Company
Contractors

Towers

Material Handling Methods That Keep Pace With Modern Building Design

American Tubular Towers are flexible and adaptable to meet fully the requirements of today's newest building design.

These towers are developed to the most modern degree and utilize every possible idea for most economical handling of materials.

As an instance—landing platforms, for set back floors, can be attached to the tower at any elevation, as shown in the illustration. On some buildings of this type the lower part of the tower has been located inside the building proper, coming outside at the first or second set back.

Obsolete, out-of-date material handling equipment slows up a job—is unsafe, inefficient and expensive to use. American Tubular Towers are modern and money saving in every respect . . . a permanent asset. A representative in your district can give you some valuable material handling ideas. Towers for lease and for sale. Write for a catalog.



DRAVO EQUIPMENT COMPANY

GENERAL OFFICES: PITTSBURGH·PA·

DISTRIBUTORS IN PRINCIPAL CITIES

DRAVO

SEARCHLIGHT SECTION

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Positions Wanted, 5 cents a word, minimum \$1.00 an insertion, payable in advance.

Positions Vacant and all other classifications, 10 cents a word, minimum charge \$2.00.

Proposals, 50 cents a line an insertion.

INFORMATION:

Box Numbers in care of any of our offices count 10 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals.)

DISPLAYED—RATE PER INCH:

1 inch\$7.50
2 to 3 inches..... 7.25 an inch
4 to 7 inches..... 7.00 an inch

An Advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

C.M.

STEEL SHEET PILING

Bought. Sold. Rented.

WEMLINGER INC.

Service, Technical advice,
Stocks on hand everywhere.

149 BROADWAY NEW YORK

POSITION VACANT

SUPERINTENDENTS of construction, engaged entirely in heavy construction work, experienced in hydro-electric construction, concrete and earth dams, power houses, rock excavations, etc. If you are open for a position of this description, advertise in the Searchlight Section of Construction Methods. Send your ad to the Searchlight Dept. Tenth Ave. at 36th St. New York.

POSITIONS WANTED

DO YOU NEED a power superintendent? Electric, steam, gas and air. PW-91. Construction Methods, Tenth Ave. at 36th Street, New York.

WANTED. If you are in need of Construction Engineers, experienced in superintending, estimating, drafting and purchasing, you should place your need before the live wire readers of Construction Methods. Send your ad today to Searchlight Dept. Construction Methods, Tenth Avenue at 36th St., New York.

CONSTRUCTION superintendents, experienced in concrete arch bridges, difficult foundations, river work, heavy shoring, cofferdams, pile driving, sewage treatment, water purification plants, etc., can readily be obtained through an advertisement in the Searchlight Section of Construction Methods. Send your ad today to Searchlight Dept., Construction Methods, Tenth Avenue at 36th St., New York.

STEEL SHEET PILING

Saves you money and trouble in Foundation, Cofferdam, and Sewer work.

Bought-Sold-Rented—Always carried in stock

LONG DISTANCE TELEPHONE: CENTRAL 0491

S.W. LINDHEIMER, Inc.

31 South Clarke St. CHICAGO



GREENSPON'S

ODEE Pipe for gas lines—factory-welded into double lengths, to cut field welding. Plain end and threaded pipe, with or without couplings. Casing in all sizes. All ready for immediate shipment from strategic centers.

Jos. GREENSPON'S Sons
IRON & STEEL CO.

ST. LOUIS NEW YORK CITY
TULSA BORGER, TEX.
WHEATLAND, PA.

PIPE FOR ALL PURPOSES.

“Opportunity” Advertising:
Think “SEARCHLIGHT” First!

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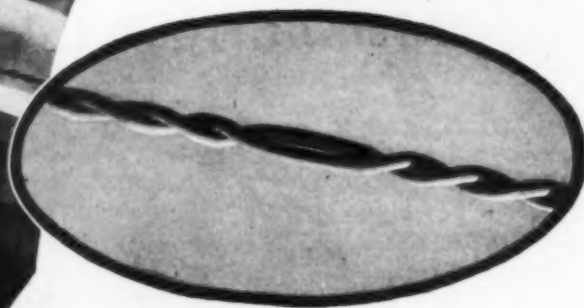
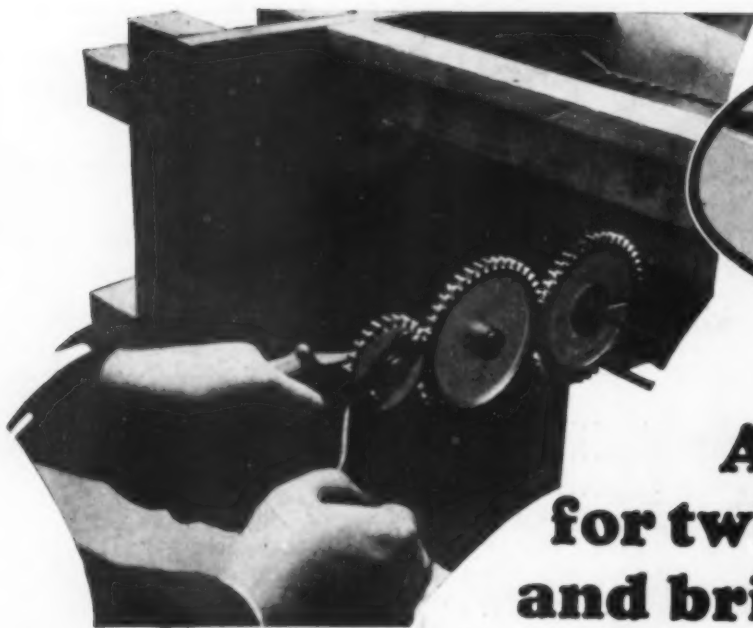
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ALPHABETICAL INDEX TO ADVERTISERS

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	Page		Page		Page
American Institute of Steel Constr..	81	Flory Mfg. Company, S.....	102	Morris Machine Works.....	78
Ames Shovel & Tool Co.....	8	Foote Company	24	Mundy Hoisting Engine Co., J. S....	102
Austin Western Road Machry. Co..	99	Fundom Hoist & Shovel Co.....	100		
				National Carbon Co., Inc.....	28
Baker Mfg. Co.....	107	General Electric Co.....	85	Northwest Engineering Co.....	5
Barber Asphalt Co.....	108	Good Roads Mchry. Co.....	88	Novo Engine Co.....	87
Barber-Greene Co.	75	Grasselli Chemical Co.....	96		
Barnes Mfg. Co.....	73			O. K. Clutch & Mchry. Co.....	100
Bay City Shovels, Inc.....	4th Cover	Hercules Motor Corp.....	89	Owen Bucket Co.....	11
Bethlehem Steel Co.....	16	Homelite Corporation	104		
Blaw-Knox Co.	6	Huber Mfg. Co.....	108	Plymouth Locomotive Works.....	15
Browning Crane Co.....	72	Hunt & Son Co., C. B.....	80	Porter Co., H. K.....	12
Bucyrus-Erie Co.	9				
Buffalo-Springfield Roller Co.....	90	Independent Pneumatic Tool Co....	80	Ransome Concrete Mchry. Co.....	68
Buhl Company	94	Ingersoll-Rand Co.....	2nd Cover	Republic Rubber Co.....	91
Byers Machine Co.....	3	Insley Mfg. Co.....	14	Riddell Co., W. A.....	90
		International Cement Corp.....	10	Rogers Brothers Corp.....	84
Carey Company, Philip.....	4			Royson Mfg. Co., Inc.....	112
Carnegie Steel Co.....	74	Jaeger Machine Co.....	94		
Carter Co., Ralph B.....	104			Schramm, Inc.	107
Caterpillar Tractor Co.....	18	Koehring Company.....	26	Searchlight Section	110
Cleveland Container Co.....	78	Kolesch & Co.....	92	Slate Constr. Company.....	84
Cleveland Rock Drill Co.....	96			Starrett Co., L. S.....	102
Cleveland Tractor Co.....	77	Lakewood Engineering Co.....	7	Sterling Wheelbarrow Co.....	71
Clyde Iron Works Sales Co.....	79	Laughlin Company, Thomas.....	105	Sullivan Machinery Co.....	82
Columbia Products Co.....	27	LeRoi Company	21		
Columbus-McKinnon Chain Co....	20	Leschen & Sons Co., A.....	13	Thew Shovel Co.....	67
Continental Rubber Works.....	25	Lincoln Electric Co.....	76	Toledo Pressed Steel Co.....	78-100
Continental Motors Corp....	3rd Cover	Lowell Wrench Co.....	86	Toledo Wheelbarrow Co.....	106
Dietz Co., R. E.....	71	McGraw-Hill Book Co.....	90	Union Iron Works.....	19
Dixon Crucible Co., Joseph.....	92	McKiernan-Terry Drill Co.....	70	Universal Crane Co.....	17
Dodge Bros. Corp.....	101	Marion Steam Shovel Co.....	29	Universal Portland Cement Co....	30
Domestic Engine & Pump Co.....	83	Metalweld, Inc.	92	Universal Power Shovel Co.....	97
Dravo Equipment Co.....	109	Metropolitan Paving Brick Co....	42-43		
		Mohawk Asphalt Heater Co.....	86	Wappat Gear Works, Inc.....	107
East Jersey Pipe Co.....	106	Monarch Tractor Corp.....	23	Watson-Stillman Co.	104
Edelblute Company, T. H.....	22	Moore Trench Machine Co.....	98	Waukesha Motor Company.....	93
Eisemann Magneto Corp.....	108			Western Wheeled Scraper Co.....	95
Evinrude Div., Outb'd Motors Corp.	69			Williams Concrete Equipment Co..	94
Fairfield Engrg. Company.....	88				
Fate-Root-Heath Co.....	15				



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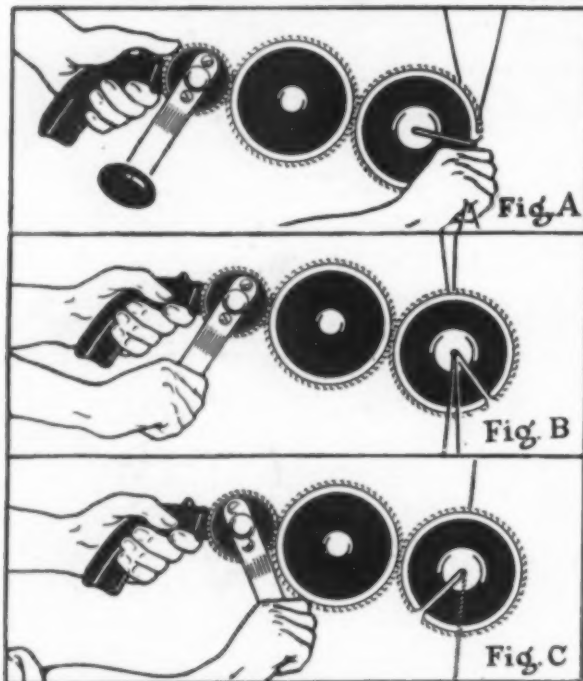
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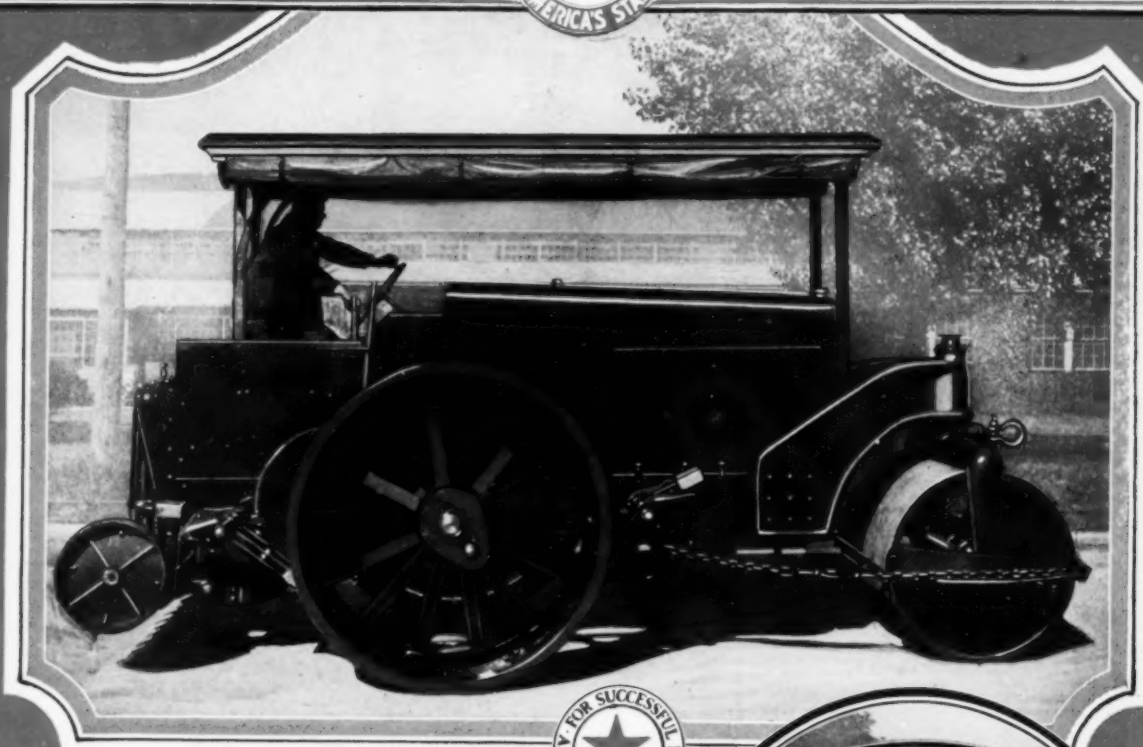
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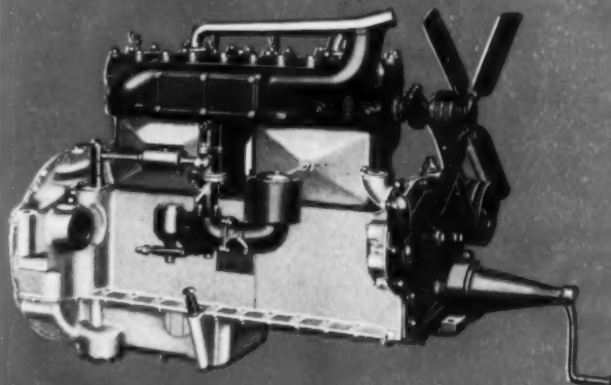
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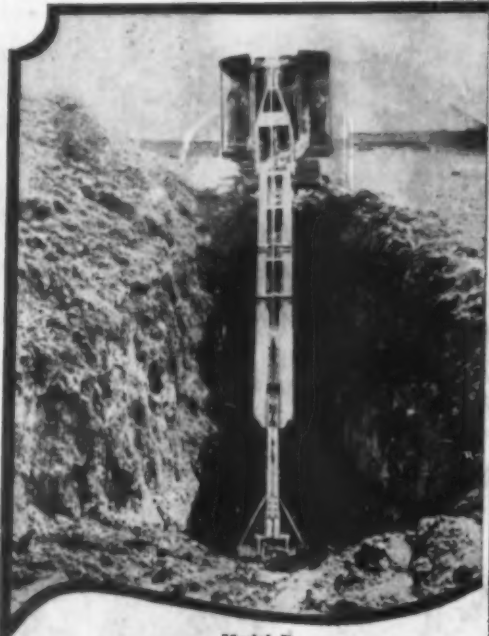
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